

This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

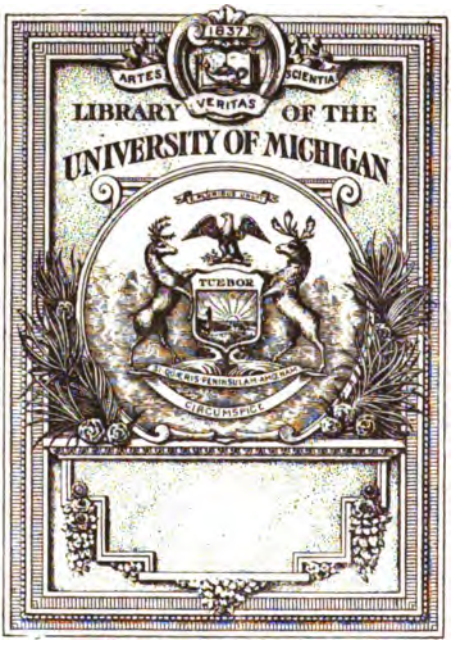
+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`



THE GIFT OF
Dr. Hugo Erickson

TR
1
.I61

The International Annual

of

Anthony's Photographic Bulletin

and

American Process Year-Book



VOLUME XI. FOR 1899

Edited by

W. I. SCANDLIN

PUBLISHERS

NEW YORK
E. & H. T. ANTHONY & CO.
591 Broadway

CHICAGO
E. & H. T. ANTHONY & CO.
45-47-49 East Randolph St.

LONDON
PERCY LUND, HUMPHRIES & CO., Ltd.
3 Amen Corner.
Bradford, The Country Press



Copyright, 1898, by
E. & H. T. Anthony & Co.

The Knickerbocker Press, New York

PREFACE.

IN placing the Eleventh Volume of the INTERNATIONAL ANNUAL before the public, we would extend our hearty thanks to its many friends, old and new, who by their generous co-operation in the contribution of articles and illustrations have made its production possible. The preparation and compilation of material so cheerfully provided is a pleasant task, and one that brings us into close fellowship with each other. It has been our constant aim to make the present volume as perfect in its technical execution as possible, that it may stand as an example of good book-making throughout; and our thanks are due to our publishers for their liberal policy and support toward this end.

THE EDITOR.

NEW YORK, November, 1898.

32318

INDEX TO ADVERTISERS

	PAGE
Acme Water Color Co.	19
Actien Gesellschaft fur Anilin Fabrikation	69
Adams & Westlake Co.	46
Albany Engraving Co.	11
American Aristotype Co.	back cover
American Camera Mnfg. Co.	50, 51
American Photo Supply Co.	83
Autotype Co.	20
Babajee Sakharam & Co.	26
Baltimore Engraving Co.	65
Bamforth, James	46
Beck Engraving Co.	43
Benedict, Geo. H. & Co.	76
Blanchet Freres & Kleber	22
Boston Engraving Co.	43
Butts & Adams	54
Carbutt, John	44, 45
Climax Plates	72
Collins Mnfg. Co., A. M.	79
Coloritype Co.	73
Cooper & Co., Chas.	13
Cramer Dry Plate Works	29
Dallmeyer, Ltd., J. H.	2d and 3d cover
Eastman Kodak Co.	40, 41
Electric City Engraving Co.	54
Electro-Light Engraving Co.	66
Flinsch Machinery & Iron Founding Company, Ltd.	15
Gage & Sons, William C.	63
Gatchell & Manning	15

PAGE

Gennert, G. 55, 56, 57, 58
Gill Engraving Co. 54
Goerz, C. P. 53
Gundlach Optical Co. 7
Hammer Dry Plate Co. 31
Higgins, Chas. M. & Co. 43
Horgan, Robey & Co. 8
Hume, William 61
Hyatt, H. A. 67
Iliffe Sons & Sturmey 81
Illinois Engraving Co. 38
Iron Cottage Co. 11
Levy, Max 16
National Photograph Machine Co. 24
National Photo Engraving Co. 42
Nelson Dale & Co., Ltd. 29
Nepera Chemical Co. 5
New York Camera Exchange 77
New York Dry Plate Co. 27
Penrose & Co. 9
Photo Chromotype Engraving Co. 66
"Photograms" 52
Rochester Optical Co. 75
Royle & Sons, John 3
Sanders Engraving Co. 19
Schering & Glatz 71
Seed Dry Plate Co., M.A. 38
Suffolk Engraving Company 15
Teachenor-Bartberger Engraving Co. 73
Van Ness & Moessner 38
Voigtlaender & Son 58
Weeks Photo Engraving Co. 42
Western Engraving Co. 76
White, O. C. 1
Willis & Clements 19

INDEX TO SUBJECTS

PAGE

A Few Hints, by E. S. Kibbe 61

A Few Thoughts on Photographing in Natural Colors, by Jabez Boothroyd 72

A Holiday Ramble, by M. W. Thompstone 99

Album Suggestions, by Wilbur M. Stine 164

A Method of Developing, by Prof. H. R. Proctor, F.I.C. . . 151

An Apparatus for Showing Stereoscopic Transparencies, by Eli Hirst 35

A New Studio for Reproductions, by A. C. Angerer . . . 199

A Photographic Trip to Holland and Germany, Showing the Possibilities of a Hand Camera, by H. Pickering . . . 179

A Ramble with Cycle and Camera in and around Kidderminster, by Digby Cotes-Preedy 4

A Remonstrance, by Clarence Nelson Whittaker . . . 42

A Suggestion as to the Judging of Pictures at Photographic Conventions, by Gustine L. Hurd 94

A Waste of Time and Money, by "Anti-Landscape" . . . 95

Bayham Abbey, by Joseph Chamberlain 152

Bromide Paper, and its Successful Treatment, by Frederic G. P. Benson 24

Christmas and Other Cards, by H. Crisp 67

Cloud Negatives—Their Production and Use, by Fred. H. Davies, 60

Cloud Printing, by Martin J. Harding 45

Collodion Transfer Paper, by A. C. Champagne 184

Deerhurst Church and Odda's Chapel, by T. Perkins . . . 50

Developing Under Difficulties, by Dwight L. Elmendorf . . 185

Development of Under-Exposed Plates, by Frederick Thomas Bennett 13

Experimenting, by F. Dundas Todd 3

PAGE
F 7.7, by Henry Wenzel, Jr. 110
Finishing Platinotype Prints, and other Notes, by W. Cooper . 78
Focimeter (A), by Robert H. Bow, C.E. 14
Hand Cameras, by L. V. Kupper 130
How to Use a Negative Film without a Support, by H. D. Farquhar 206
Illustrative Photography and a New Process, by Ernest Beringer, 71
Improved Trough for Alum or Hypo, by H. Hands . . . 59
Industrial Photography, by Dr. Hugo Erichsen 46
Last Year's ANNUAL: A Note, by Digby Cotes-Preedy . . 62
Latitude of Plate, by Alfred Watkins 63
Long-Focus Lenses and Camera Improvements, by H. W. Hales . 41
Modification of an Old Method for Making Panoramic and Stereoscopic Photographs, by O. G. Mason 91
Mutual Help by Recording Experiments Accurately, by Rev. F. C. Lambert 77
Needs of Amateurs, by Robert E. M. Bain 34
New York City in Summer, by Walter Sprange 18
Northumbrian Borders, by George Kilburn 171
Note for Non-Sketchers (A), by "Verton" 39
Old Processes, by P. C. Duchochois 210
On Enlarging from Small Hand-Camera Negatives, by Robert J. Hillier, M.R.C.S., L.R.C.P. 31
On Making Prints—Of the Foot, by H. H. Williams . . . 15
On the Golf-links with a Hand Camera, by Miss Adelaide Skeel. 116
On what Distance Should we Focus Sharply, by F. Paul Liesegang, 169
Ortol, by J. Joé 33
Ortol: A New Developer, by C. H. Bothamley 48
Oval Mat (An), by Milton B. Punnett 53
Paraphernalia for Peripatetic Photographers, by Reginald A. R. Bennett, M.A. 68
Permanence, by H. M. Beeles 66
Photographic Surveys and Surveying by Photography, by J. H. Harvey 115
Photographic Surveys and Topographical Rambles, by S. E. Kelf, 83

PAGE
Photographs of Flowers, by J. N. Gerard 148
Photography and Art in Half-Tones, by James B. Carrington . 96
Photography for Decorators, by Charles W. Canfield . . . 97
Photography of Flowers, by Joseph F. Smith 125
Photo-Micrography with Dark Field Illumination, by W. H. Walmsley 139
Posing or Exposing, by E. E. Weatherby 79
Potassium Platinite, by H. F. Raess 65
Preparation of Plain and Salted Paper for Silver Printing (The), by John R. Clemons 28
Printing Quality of Negatives, by W. Lansing 147
Process for Obtaining Line Screens for Phototypography, by Charles Gravier 208
Screens for Three-Color Work, by Max Levy 203
Some Hints on Interiors, by H. M. Gassman 176
Some Screenings, by C. B. Talbot 212
Special Treatment of Hand-Camera Exposures, by A. D. Guthrie, 1
Sunset Pictures, by Maximilian Toch 122
Tank Development, by John M. Nicol, Ph.D. 102
The Color of the Finished Print, by E. L. Bowlus 107
The Determination of the Focal Length in Photogrammetry, by Commandant V. Legros 128
The Fixing Bath, by Alfred Stieglitz 12
The Ministry of Art and Religion—A Parallel, by E. K. Hough, 119
The Naval and Military Use of Kite Photography in Time of War, by William A. Eddy 104
The Photogravure Process, by F. A. Ringler 211
The Platinum Process; its Simplicity, by J. Gaedicke . . 160
The Proving of Zenker's Thin Leaves in the Color Pictures Taken after Lippmann's Process, by Dr. R. Neuhauss . . . 133
The Roller Squeegee, by Chapman Jones 87
The Selection and Care of Photographic Lenses, by Harold Serrell, 81
The Theory of Half-Tone Press Printing, by Romyn Hitchcock. 201
The Water Front of New York City, by C. M. Giles . . . 165
Twenty Thousand Dead Men, by Henry Erle Cooper . . . 36

PAGE

Warwick Castle, by Signor R. Aspa 188
What do We See, by Prof. C. H. Cox 54
What to Photograph, by Matthew Surface 88
Wheeling a Camera, by James Reuel Smith 29

PROCESS WORK.

A New Studio for Reproductions, by A. C. Angerer . . . 199
How to Use a Negative Film without a Support, by H. D. Farquhar, 206
Old Processes, by P. C. Duchochois 210
Process for Obtaining Line Screens for Phototypography, by Charles Gravier 208
Screens for Three-Color Work, by Max Levy 203
Some Screenings, by C. B. Talbot 212
The Photogravure Process, by F. A. Ringler 211
The Theory of Half-Tone Press Printing, by Romyn Hitchcock . 201

TABLES AND FORMULAS.

Albumen Paper 261
Amidol 238, 247
Aristo Blue Label Paper 261
Aristo Junior Paper 260
Aristo Single Toner 259
Artotype Formulas 272
Blue Print Formulas 262
Bromo-Hydrochinon Developer 247
Collodion 270
Combined Toning and Fixing Baths 262
Defects in Negatives 257
Developers 217
Development Pointers 265
Eikonogen 230
Enamel Solutions 270
Ferrous Oxalate 234
Fixing Baths 249

PAGE

Formulas and Tables 217
Glycin 248
Glycin-Pyro 248
Hydrochinon and Metol 245
Hydrochinon 227
Intensification 252
Metacarbol 227
Metol 225, 235
Metol-Bicarbonate 246
Mountants 263
No-Gold Combined Bath 262
Opals 234
Orthochromatic Sensitizing Baths 258
Ortol 249
Process Formulas 270
Pyrogallol 217
Reduction 254
Reversed Negatives 264
Rodinal 247
Royal Bromide Paper 240
Steel 271
Stripping Film 275
Tables and Formulas 217
Toning Formulas 259
Toning Solution 236
Transparencies 234
Uranium Toning Solution 236
Velox 237

SOCIETIES.

Societies 278

INDEX TO AUTHORS.

	PAGE
Angerer, A. C.	199
"Anti-Landscape"	95
Aspa, Signor	188
Bain, R. E. M.	34
Beeles, H. M.	66
Bennett, Frederick Thomas	13
Bennett, Reginald A. R., M.A.	68
Benson, Frederic G. P.	24
Beringer, Ernest	71
Boothroyd, Jabez	72
Bothamley, C. H.	48
Bow, R. H., C.E.	14
Bowlus, E. L.	107
Canfield, Charles W.	97
Carrington, James B.	96
Chamberlain, Joseph	152
Champagne, A. C.	184
Clemons, John R.	28
Cooper, Henry Erle	36
Cooper, W.	78
Cotes-Preedy, Digby H. W.	4, 62
Cox, Prof. C. H.	54
Crisp, H.	67
Davies, Fred. H.	60
Duchochois, P. C.	210
Eddy, William A.	104
Elmendorf, Dwight L.	185
Erichsen, Dr. Hugo	46
Farquhar, H. D.	206

PAGE
Gaedicke, J. 160
Gassman, H. M. 176
Gerard, J. N. 148
Giles, C. M. 165
Gravier, Charles 208
Guthrie, A. D. 1
Hales, H. W. 41
Hands, H. 59
Harding, Martin J. 45
Harvey, J. H. 115
Hillier, Robert J., M.R.C.S., L.R.C.P. 31
Hirst, Eli 35
Hitchcock, Romyn 201
Hough, E. K. 119
Hurd, Gustine L. 94
Joé, J. 33
Jones, Chapman 87
Kelf, S. E. 83
Kibbe, E. S. 61
Kilburn, George 171
Kupper, L. V. 130
Lambert, Rev. F. C. 77
Lansing, W. 147
Legros, Commandant V. 128
Levy, Max 203
Liesegang, F. Paul 169
Mason, O. G. 91
Neuhauss, Dr. R. 133
Nicol, John M., Ph.D. 102
Perkins, T., M.A., F.R.A.S. 50
Pickering, H. 179
Proctor, H. R., F.I.C. 151
Punnett, Milton B. 53
Raess, Henry F. 65
Ringler, F. A. 211

PAGE

Serrell, Harold 81
Skeel, Miss Adelaide 116
Smith, Jas. Reuel 29
Smith, Joseph F. 125
Sprange, Walter 18
Stieglitz, Alfred 12
Stine, Wilbur M. 164
Surface, Matthew 88
Talbot, C. B. 212
Thompstone, M. W. 99
Toch, Maximilian 122
Todd, F. Dundas 3
" Verton " 39
Walmsley, W. H. 139
Watkins, Alfred 63
Weatherby, E. E. 79
Wenzel, Henry, Jr. 110
Whittaker, C. N. 42
Williams, H. H. 15





NEGATIVE BY RALPH BROWN, NEW YORK.

PRINTED ON "ARISTO" PLATINO PAPER
AND TONED WITH ARISTO SINGLE TONER.

THE
INTERNATIONAL ANNUAL
OF
Anthony's Photographic Bulletin
AND
AMERICAN PROCESS YEAR-BOOK.
1899.

SPECIAL TREATMENT OF HAND-CAMERA EXPOSURES.

By A. D. Guthrie.

THE exposures made in a hand-camera are frequently subject to very varied conditions of light; consequently, numerous plates are wasted for the want of some methodical treatment in development. In developing shutter-exposed plates, if full exposure has been obtained, then the ordinary modes of procedure suffice; so also when over-exposure occurs, but by far the greater proportion of failures seen in this class of work arise simply from under-exposure. There seems an attraction to many workers to use their shutter at its full rapidity and the lens stopped down, and the wonder is that they obtain any good results at all. In developing, it is a good plan to obtain all the detail possible at first, and treat the plate for density afterwards; thus in using pyrogallic acid, keep the quantity low until the necessary details are out, and finish development with a stronger solution. The following treatment has been found very effective for exposures made under varied conditions and developed at the same time. Develop in one dish with a reliable one-solution developer, such as

Amidol	20 grains.
Sodium sulphite	½ ounce.
Water	7 ounces.

This will bring out rapidly all the detail in the plate, and if over-exposure is feared, dilute with an equal quantity of water to restrain the action. In another dish have the following re-developer to impart density to the plates as they become ready for the operation, or to successfully deal with any which are found

to have been considerably over-exposed, and upon which the first developer is acting too vigorously.

RE-DEVELOPER.

No. 1.

Hydroquinone	¼ ounce.
Sodium sulphite	2 ounces.
Potass bromide	¼ ounce.
Boiling water	12 ounces.

No. 2.

Washing soda	2 ounces.
Sodium sulphite	2 "
Water to make	12 "

For use, mix equal quantities.

By using two different developers in this manner, it becomes a simple matter to produce good negatives from plates having had all kinds of exposures, some under, some over, and it may be some which have had about the right exposure. In this way one of the most fruitful causes of failure in the production of hand-camera pictures—error in exposure and development—is minimized, if not altogether done away with.



Photographed by A. D. GUTHRIE
At the Photographic Convention of Great Britain
Meeting July, 1898

THE DUC D'ABRUZZI'S YACHT "BONA
At the Mudhook Club's Regatta

EXPERIMENTING.

By F. Dundas Todd.

PHOTOGRAPHERS, if one judge by their own story, are great in experimenting. Talk a few minutes to a professional, and you will find he has been trying a new brand of plate or paper; to an amateur, and you will learn he has been experimenting with developers. And, worst of all, they want to tell their impressions. I used to listen patiently to them all, but of recent years I have rebelled, and now I inform them that, to my mind, they are simply wandering in a bog, and all they have done is to waste time and money, for their results are worthless.

I have been through the mill myself. Before I had been dabbling in photography three months I had tried about sixty different developing formulas—and found them all bad. I would show some of my negatives to a friend, and after a casual look at them he would begin: "What developer did you use?" Out came my note-book, and I would read off the particulars. Then he would coolly say: "Oh, I have used that; it is the plate-maker's formula, but it is no good. The only thing to use with the 'A' plate is 'B' developer, and if you use the 'B' plate you should get the formula recommended by the makers of the 'C' plate."

Of course, I took his advice. I took anybody's advice in those days, and then my next friend would put me through a course of education entirely dissimilar from what I had received from number one. The photographic journals in those days were strong on formulas, and every week published some half-dozen new ones, and I think I tried them all. None of them ever seemed to suit my particular case, for my negatives never pleased my friends, and it was for their approbation I worked, not my own.

The pace was lively while it lasted, but I soon got tired of it, and he will be a clever man who will get me into such a weary, useless round again. The formulas recommended by the plate-maker and paper-maker are quite good enough for me, and once I had learned that, I had learned much.

One reason why so many experiments made by photographers are so frequently of no value is that the average man does not know the first rule of experimenting, especially when a comparison is desired; which rule is to make only one variation at a time. I have been told, for instance, that a certain plate was faster than another, when I knew the facts were the reverse, and then I would find out that the opinion had been arrived at from the result of a snap-shot made in a street compared with one made on a country scene. Here were two variations, but all the same the result was taken as conclusive.

After what I have written, the reader will be inclined to think that I am utterly opposed to experimenting, but that is not so; all I want to do is to divert it into profitable channels. Every now and then I catch the craze, but I always tie it down to practical lines. For instance, I once took a fancy to study the great big problem of the lighting of landscapes, and I picked out some half-dozen subjects, and photographed each every two hours when the sun was shining, and then repeated when the sky was cloudy. Then I did the same thing with buildings, and from these I learned more about lighting in a week than I could learn in a lifetime by desultory work.

Another time I tackled interior photography, and for three months worked on one problem. I chose a room where a lace curtain hung in front of the window, and a grained oak bookcase stood near the camera. I wanted to show the detail in the lace curtain against the sky, and at the same time the graining on the shadow side of the bookcase. I used over a gross of plates before I succeeded, but "I got there."

Of late years portraiture has been my hobby, and recently I have been working on a very interesting point, namely, the effect of variations in the respective positions of body, head, and eyes with regard to the lens. One can work out innumerable combinations here, and it is simply surprising how diversified are the results. I prefer to use a child about ten or twelve years old, so that there will be no suggestion of forced expressions, and I find that one can make a subject look alert or stupid, pensive or gay, cunning or frank, haughty or submissive, simply by the relative position of body, head, and eyes.

A RAMBLE WITH CYCLE AND CAMERA IN AND AROUND KIDDERMINSTER.

By Digby Cotes-Preedy.

"TEMPUS FUGIT" is a truism brought forcibly to my mind on receiving the Editor's request for another article. Last year I left my readers in the "Land of the Harp" among

> "Mountains that like giants stand
> To sentinel enchanted land"

and amid wooded glens, through which flow trout-filled streams, along whose banks wandered the bards of old. This summer we will take an instructive and interesting ramble in the grand old county of Worcestershire. The town I propose to make our

starting-point is one by no means directly associated with the many wars and revolutions that mark the early and middle ages in English history, but is eminent for its industrial enterprise. Situated on the river Stour, Kidderminster presents an irregular appearance, and is famous for its manufacture of carpets of world-wide reputation. The first historical reference to the town we read of is the granting to Earl Cynebert of land on both sides of the river by Ethelbald, King of the South Angles. At the Norman Conquest all the neighborhood became the property of the Crown and continued so until the time of Henry II., who gave it to the family of Bisets. During the reign of Edward I., most of the land was left to the Hospital of Maiden Bradley, in Wiltshire. After various changes, the bulk of the property passed into the hands of the late Lord Ward, Earl of Dudley.

The church of St. Mary and All Saints, reminding one that

> ". . . Time doth consecrate
> And what is gray with age becomes religion,"

will prove the principal object of interest to a visitor. It is a stone building in the Early English style, on the same spot as one believed to have been built by Earl Cynebert about A. D. 736. Since then many successive edifices have risen on this site. The existing pile is situated on an eminence overlooking the valley of the Stour, while a battled and pinacled western tower forms a conspicuous landmark for miles around. An extensive restoration took place in 1895. The chancel is in the decorated style with triple sedilia of simple yet elegant proportions. The lofty nave belongs to the Early English period and possesses a perpendicular clerestory. In the south porch stands an alabaster altar-tomb of most excellent workmanship. Neither time nor space will permit me to describe in detail all the beauties to be seen in this sacred edifice, such as the ancient tombs, splendid stained windows, sculptures and organ, which to do justice to would require a far abler pen than mine.

Before bidding adieu to the town in order to explore the neighborhood, mention must be made of two famous names with which Kidderminster is linked. One is Richard Baxter, born at Rowton in Shropshire, who came as minister to this town in 1640, leaving for a while to become chaplain in the Parliamentary army on the breaking out of the civil war. He was the author of the *Saints' Rest.* His pulpit is preserved in the Unitarian chapel, while a portrait of this famous Non-conformist preacher can be seen in a building adjoining the Parish Church. An excellent white marble statue of Baxter stands in the Bull Ring. The other native celebrity belongs to our own time, namely, Sir Rowland Hill, born in 1795. He made his name forever famous by inaugurating the Penny Postage in January, 1840. Many

buildings are worthy of mention and inspection, but we must mount our " iron steeds " for the tour in the vicinity.

Wheeling along the Birmingham road for about three miles we shall find ourselves on what is locally known as the " Blacksmith's Hill." From the summit, a small but charming view unfolds itself. At our feet snugly lies the growing village of Blakedown, while the background comprises the Hagley and Clent hills. There is nothing of special attraction in the village itself. Taking a turn to the left after a few minutes' ride, we shall be in the small village of Churchill, possessing a pretty modern church sheltered by fine yew-trees. On the right of the Birmingham road is an ivy-crested residence — Springbroke House — situated on an eminence. In the grounds are several pools of increasing size till we finally reach the most distant one, known as the "Ladye Pool." This large sheet of water greatly enhances the beauty of the whole picture which is at this moment presented to us. There is a grim legend connected with the dark and deep lake, which I think best to leave to the imaginative minds of the fair portion of my readers. While in this enchanted spot we can almost fancy that we hear Mowgli " helping the frogs through their choruses, or mocking the little upside-down owls that hoot through the white nights "; but we cannot linger here watching the gambols of coot and moor-hen and wondering what dreadful secrets the placid water hides, for we must hie on towards Hagley, where plenty of photographic work awaits us. Leaving Blakedown we pass, on the right, an interesting black-and-white timbered house, called Harboro Hall. Slightly farther on is Harboro Wood,



The Ladye Pool, Blakedown

" . . . Where dusky night dwells
Forever 'neath the shafted pines."

Bearing to the right, up rather a steep hill, we at length reach Hagley, a savage place in Saxon times, hidden midst a wild oak

forest, with its " multitude of hogs " and manor place, the abode of a great Saxon lord. Making directly for the park we find ourselves facing the church and hall. With regard to the former, it cannot boast of very remote antiquity, as it was probably rebuilt in the reign of Henry III., perhaps by one of the Somerys, Baron of Dudley, at that time lord paramount of Hagley. " In the south aisle is a decorated piscina, and here was originally an altar, the aisle or chapel being dedicated to the Virgin, and lands being given for the celebration of masses there. A field called the Aspes or Lamplands was likewise given for the maintenance of a lamp in the church to burn continually before the host." It was enlarged in 1827 by the addition of a north aisle and a tower was added in 1865. Leaving the church, we take a passing glance at the hall, the home of the Lyttleton family, which can be traced back nearly to the time of the Conquest. This stiff and by no means beautiful structure has a background of magnificent trees, while the surrounding landscape has few equals in the county.

Hagley Park seems to have been a favorite haunt for poets. On a certain spot stands a rustic building called Thomson's seat. Farther on is Milton's Hill. Near the summit is found a seat, inscribed with the few following lines from the " Morning Hymn " in *Paradise Lost*:

> " These are Thy glorious works, Parent of good,
> Almighty ! Thine this universal frame,
> Thus wondrous fair: Thyself how wondrous then,
> Unspeakable ! Who sitt'st above these heavens
> To us invisible, or dimly seen
> In these Thy lowest works; yet these declare
> Thy goodness beyond thought, and power divine."

From this hill one obtains a prospect, perhaps the finest in England, eminently characteristic of what is best in English scenery. " The prospect from the hill at Hagley, measured along the horizon, must at the lowest estimate, be not less than fifty miles in longitudinal extent; measured laterally from the spectator forwards at least twenty. Some of the Welsh mountains which it includes are nearly thrice that distance; but then they are mere remote peaks, and the area at their bases not included in the prospect. The real area, however, must rather exceed than fall short of a thousand square miles; the fields into which it is laid out are but small, scarcely averaging a square furlong in superficies, so that each square mile must contain about forty, and the entire landscape about forty thousand. With these are commixed innumerable cottages, manor-houses, villages, and towns. Here the surface is dimpled by unreckoned hollows; there fretted by uncounted mounds: all is amazing, overpowering multiplicity—multiplicity which neither the pen nor the pencil can adequately

express ; and so description, in even the hands of a master, sinks into mere enumeration."

Having proved for ourselves the truth of Hugh Miller's description of the scene, we regain the highroad and the "Lyttleton Arms," where all the wants of the inner man and those of our "steed" can be supplied. From here we pedal along towards the village of Clent, which we reach in about a quarter of an hour. The Clent hills, "eastern outlines of the mountain region of Great Britain," form part of the watershed of England. "Looking down thence, southward and northward, one sees represented in the scene before him, in a remarkably complete manner, the chief sources of the great importance of our little island of Great Britain among the countries of the earth. Those great clouds of smoke that darken the whole northern and eastern heavens, and which, during the prevalence of winds from those quarters, blacken the north and east sides of the trees on Clent Hill and the wool of all our sheep—for one never sees here a milk-white sheep as in more rural districts—tell of that mineral wealth of England, its coal and iron, on which its world-wide commerce and its mechanical pre-eminence has mainly depended: while to the south and west is the beautiful vale of the Severn, representing its pastoral and agricultural wealth." Before we leave Clent, the church, rebuilt in 1865, should be explored, for it possesses some carvings and interesting Norman work.



Old Manor House and Moat, Harrington

Proceeding eastward, we come across the chapel of St. Kenelm in all its solitude but picturesquely situated. "It is built partly over a deep valley, and when viewed from the east, assumes an elevation superior to that of the opposite point, which is the site of the tower." On the south wall is a curious carving representing the child Kenelm, about whose history a few words may be of interest. Kenelm was King of Mercia, about A.D. 806. He ascended the throne at the age of seven. His reign soon came to an end, for he was cruelly murdered by Askobert, the lover of



Photographed by E. C. DINTURFF.
Engraved by
ART PHOTO ETCHING CO.,
New York.

A CONVENTION PRIZE WINNER.

P. A. of A., 1898.

his elder sister Quendreda, who coveted the throne. Legend says the murder was discovered by means of a dove which dropped a scroll of parchment on the altar of St. Peter's, Rome, inscribed in Saxon characters, and translated by Milton as follows :

> " Low in a mead of kine, under a throne,
> Of head bereft, li'th poor Kenelm, king-born."

The Pope having received this document, immediately ordered the Archbishop of Canterbury to investigate the matter. Search being made, the body was found and removed with great pomp to Winchcomb Abbey, where it was interred. A beautiful specimen of Norman architecture appears in the arch over the door of the church, but the greater part of the fabric appears to belong to the reign of Henry III.; while the tower, the most striking feature of the building, cannot be earlier than Henry VII.'s time. Formerly there was a well at the east end of the chapel, much resorted to by pilgrims. It was destroyed at the time of the Reformation, Bishop Latimer having used all the means in his power to discourage pilgrims going thither. Now we must retrace our steps to the " Lyttleton Arms," then proceed towards Kidderminster for a short way, when we bear left on to the Worcester road. After twenty minutes' ride the village of Harrington is reached, which years ago joined part of a large domain. About the centre of the village is a turning (on the left) into some fields which leads us to an interesting and ancient Catholic mansion surrounded by a moat. Just before reaching the house, a plate may well be expended on what was formerly a kind of dungeon, hewn out of the rock. In the house itself can be seen the hiding-places of the Catholic priests, who, about three hundred years ago, suffered persecution. Some parts of the building are over four hundred years old. Previous to the present one and on the same site, stood an ancient baronial house, the seat of the Corbets. In the reign of Edward



Front of Manor House, Harrington

I. the district seems to have teemed with wolves, for that monarch issued an order to Peter Corbet to destroy them. The place is full of interest for photographers as well as antiquarians. Rest and refreshment are obtainable at "The Dog," before continuing our journey to Hartleburg, a typical Worcestershire village. The Castle, the beautiful seat of the Bishop of Worcester, is the great attraction and well deserves to be.



In Verdant Meadows

After a short but pleasant ride, we enter the thriving town of Stourport, standing on the banks of the Severn, just where the Stour joins the famous salmon river. The church, greatly hidden by thick trees, is beautifully situated on an eminence to the left. Having crossed the river, the road takes us along the bank of the Severn, at the same time presenting excellent subjects for the landscapist. Very soon the historical and quaint town of Bewdley comes in sight. At the "George" hotel we stable our "steeds" and prepare for a photographic attack on the town. In the Domesday Book (1085) it is mentioned as Wribbenhall, a name still kept by the portion of the town on the side of the Severn nearest to Kidderminster. According to the records, the lordship of the town remained vested in the royal family till 1870, when the whole of the estates, over 2000 acres in extent, were sold to various purchasers. A prominent object is the church, restored in 1745. The tower was built about Queen Anne's time. On the same site, stood the original church, a half-timbered structure of some antiquity. Previous to the suppression of the Guilds in the reign of Edward VI., there were three endowed Charities in this church, each served by a priest of its own. In High Street is a notable house with "T. 1610 B." over the porch, well worth the expenditure of a plate. Besides the aforementioned residence, there are several buildings of interest on account of their age. We could no doubt easily spend a week in Bewdley, for many pages might be written on the opportunities in the neighborhood for the energetic camerist; but we must hasten on towards our original starting-point, though we leave the Wyre Forest behind us with a sigh of regret. Having resumed our saddles once more, we cross the river by means of a fine stone bridge. The pretty modern church of Wribbenhall we leave on our right and bear to the left, where the

road leads us to the famous Habberley Valley, a favorite haunt of seekers of lovely scenery and the picturesque. Rising suddenly from the valley is the Peaked or Peckitt Rock, worn into channels and foot-holes by human feet. The Giant's Grave is at the foot of the rock, of which the legend says: "Fingal was a giant; he had been drinking; fell off Peckitt Rock. The fall was fatal. Too big to move, peasants covered him up; so there he lies." After a few minutes' ride we once more find ourselves in the carpet town. If any of my readers stay in Kidderminster for a while, they may perhaps run across the Devil's Spadeful, which lies between the town and that of Bewdley. The name will no doubt prompt the visitor to inquire for its origin, so I have yielded to temptation and give the legend connected with the mound's name, but on no account do I vouch for its truth. It is as follows: "Many years ago a travelling boot-mender was on his way from Blackstone Rock, near Bewdley, to Kidderminster. He had a sack on his back full of worn boots. When about a mile on his way he met Satan, who was carrying an enormous shovelful of earth and rock. He said he intended putting his load in the Severn and so drown Bewdley, and asked how far off that town was. The man concocted what may fairly be considered the champion untruth of the year. He said Bewdley lay at an inconceivable distance, and that he had worn out the sack full of boots in walking from the place, which he emptied at Satan's feet. Satan then threw about a million tons of rock over the cobbler, at the same time thanking him for his information."



A Curious Tree, near Harrington

The few illustrations are of the least-known spots I have mentioned. If any visitors to this district have the time they should indulge in a most charming walk through verdant meadows and golden corn-fields. Blakedown is the starting-point, and Harrington is the end of the journey.

The leafless tree, which is very curious in form, was met with close to Harrington. The last photograph I have inserted because it is the only acknowledgment—poor though it be—which the writer can give to one who has, by her advice and help, tended to make these few lines acceptable to the many readers of the ANNUAL.

My pleasant task is ended. I lay down my pen and say with Ovid: "Laudatus abunde, non fastiditus si tibi, lector, ero."



THE FIXING BATH.

BY ALFRED STIEGLITZ.

OF all photographic manipulations, fixing plates is considered the simplest and easiest. Nevertheless, much worry is occasionally caused by neglecting to take the proper care in the preparation of the bath. Now and then, amateurs, yes, and professionals too, have complained to me that their plates would not fix, although left in the hypo for hours. The hypo has been condemned, but the dealer from whom it had been procured firmly asserts it to be the same as was delivered for years. The plate manufacturer has been written to, that his plates are worthless, whereupon he begs complainant to look at the emulsion number and recall the fact that he had been highly pleased with the brand some months previous, according to letter on file. The temperature of the bath has been carefully measured, and that was all right. The bath would not work. Where was the hitch?

Careful inquiry always revealed the fact that in making up the

solution, a handful of the salt had been thrown into some water, and although nine times out of ten it would fix the plates beautifully, the tenth time it would n't. Photographers do not seem to know that plates will not fix properly in a saturated solution of hyposulphite of soda, and the refusal of plates to fix is due to neglecting that fact.

A certain amount of care must be exercised in preparing the fixing bath. The same amount of care in preparing it as in preparing developers will often prevent much damage and annoyance.

DEVELOPMENT OF UNDER-EXPOSED PLATES.

By Frederick Thomas Bennett.

JUDGING from the poor results of much of the hand-camera work we see, I can but think the art of development is not as well understood as it might be. "Don't waste time on an under-exposed plate" is good advice when it is possible to make another exposure, but alas, with most instantaneous work we seldom get the chance of a second shot. In the development of undertimed plates the one great thing required is patience; without it we cannot hope for the best results. In my professional work I am sometimes called upon to develop plates that have received only a fraction of the proper exposure (such as the 250th of a second), and I will give my method of working, in the hope that it may be the means of helping some of my fellow-workers to produce results such as we are shown as specimens of what can be obtained with such and such a lens, or shutter. At various times I have given almost every known reducing agent a thorough trial, but am unable to find anything superior to our old friends "pyro and ammonia." As I said before, the most important thing with undertimed plates is patience; any developer will do if used properly. The art of coaxing the image out is to use a very weak developer and allow it unlimited time to act; forcing produces fog, a coarse image, and very little of the detail in the shadows where a plate is really under-exposed. The developer I use is composed as follows:

Dry Pyro	2 grains
Bromide Potassium	1 "
Ammonia	2 minims
Water	4 ounces

With such a developer the image will come up very slowly indeed, but with thin detail all over the plate. After every five minutes add another 2 minims of ammonia, which soon evaporates, and when the developer gets much stained, as it will in the course of half

an hour (having no preservative), commence again as at first, of course keeping the plate as much out of the light as possible. When all detail has been coaxed out, which may sometimes take hours, density can be quickly obtained by the application of a normal developer for a minute or two. It sounds like a very tedious operation; but if half-a-dozen plates are developed at the same time, one will be kept so busy that the time will not seem at all long, and I am sure the results will amply repay for the time and patience expended.

A FOCIMETER.

By Robert H. Bow, C.E.

TWENTY-FOUR years ago I suggested to a dealer in spectacles the following instrument for measuring the focal lengths of lenses; he adopted it, and with its working and handiness he has ever since been much pleased.

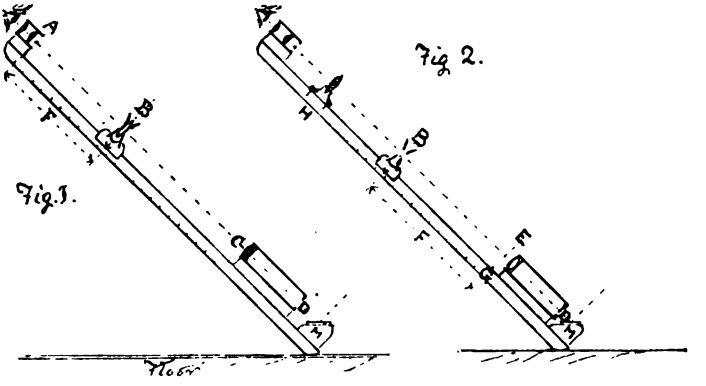
Fig. 1 shows a rectangular rod from four to five feet in length; at its upper end is attached a powerful Ramsden eyepiece, focussed on a cross-wire at A, and near the other end of the rod is a collimator C-D; the object at D should be some few parallel fine wires crossing others exactly at right angles. At M is a mirror to send the light up through the collimator. (The instrument might be worked without the mirror if pointed directly towards the sky or other light, but less conveniently.) The convex lens to be examined is slipped between a pair of clips as shown at B; the clips have a central opening through them of about three quarters of an inch in diameter, and are fixed to a sliding saddle-block. This block is now moved towards or away from A, until distinct vision of the wires at D is obtained, and the focal length F is indicated directly by a scale that measures the distance between A and B.

If the lens is a spherico-cylindrical one it must be rotated in the clips until maximum and minimum distances for A-B are arrived at on focussing in succession the wires lying in the two different directions at D.

To measure the focal length V of a concave lens, the lens may be combined with a more powerful convex one of focus X; and the length of $A - B = U$, measured for the combination, will give the value of V, thus $V = UX$ divided by $U - X$; or a table suited for the lens X may be used. But a direct and perhaps more accurate arrangement is the following one, illustrated by Fig. 2:

Choose a new zero point G, at or near the lens of the collimator, and erect there a suitable object G-E; then fix a convex

lens of 3 or 6 inches focal length, at a point H, so chosen that the object G-E will be seen distinctly through it and the eye-piece; now remove the object G-E, and insert the concave



lens to be examined, in the sliding clips B, and focus for the grating D, in the same manner as was done with the convex lens of Fig. 1, only the focal length F is now measured by the distance from E to B.

— — — —

ON MAKING PRINTS—OF THE FOOT.

By H. H. Williams.

A WISE man once said that if you would show him a foot-print, he would tell you by what bird or beast it was made.

Now it does not take a great deal of penetration or an immense intellect to discover from a photographic print to what class the maker belonged.

The "Press-the-button class" is easily distinguished. The quality of the print, the mounting, and the picture itself don't agree. People who take the trouble to finish and mount a print carefully, will take care to get the picture on the plate, have it reasonably square and upright, and, as a rule, they won't give a snap exposure to objects in deep shadow, or take a race-horse going full speed, broadside on, with an ordinary shutter.

There are, again, the spotty, finger-marked, bilious-looking prints; they proclaim loudly the name of their class. He is the "one-solution," "combined-bath," and often, I fear, the "one-dish" man. These are very bad footprints. The "Press-the-button" man *may* awake to the error of his ways, and learn the pleasure and profit of not simply "pressing the button," but "doing the

rest " himself, and so become, not a sham, but a reality, but this man rarely if ever does. Again the prints that are now good, now bad, one time a good impression, then a rough and blurred one, make yet another class of footprints, and I am not sure that this is not the worst class of all,—the man who can, when he likes, do good work, and yet is usually too lazy or careless to do it.

Yet one more class. " By their fruits shall ye know them," is still true, and applies very strongly indeed to our art. How much pleasure we give by showing a first-rate picture, one in which technical skill and artistic feeling are united, and in consequence the result is beautiful to look upon ! The footprints this man leaves, are the most distinctive of all, and cannot be mistaken for any other. It needs no wise man to tell the class of animal that left *that* impression.

Now the object of this little article is to get a few of the three first classes to give up their misdoing, and try and join the ranks of those who leave good " footprints on the sands of time,—

" Footprints that perhaps another,
Sailing o'er life's solemn main,
A forlorn and shipwrecked brother,
Seeing, may take heart again."

To take them in order. " Press-the-button " class, to use the words a friend did in telling a lady she had made a mistake in beginning by doing shutter work, " You have begun at the wrong end."

Now that is putting the matter in a nutshell. No man who simply " pushes a button " (whether he " does the rest " or not), can ever get an intelligent idea of photography ; and he will also find that if he wishes to do even moderately good work, he will have to confine himself to a very limited range of subjects.

Of those who do nothing but " press the button," it is not right to call them photographers at all. I feel like coining a Carrolistic word and calling them " Humbugrographers." When a lady, for instance, shows you a picture palpably of this class, and says sweetly, " I did this," what can you do but admire it ? And yet you know in your hearts that you are *both* humbugs. Now what to say to this class I hardly know. I fear they find vicarious honors so easily gained and so pleasant, that they would not care to " do the rest " themselves. I can only tell them that if they once felt the pleasure of showing a good picture *really* and *truly* " all my own doing," they would for the future " do the rest " themselves, and be fully repaid for the extra trouble by the increased pleasure that always follows good work accomplished.

Now for the next two classes.

" CARELESS "

is the footprint they leave. Some are ignorant, most are simply



Photographed by GEO. E. TINGLEY.
Engraved by
GILL ENGRAVING CO.,
New York, N. Y.

TOIL.

Awarded First Prize in its class and Honorable Mention
at P. A. of A. Convention, 1898.



idle and careless. What does it matter, they say, if one has had his fingers in hypo, and then picks up a wet print; "it 's only one corner spoiled," or "just one streak won't ruin it!" Oh, the terrible prints I have seen of this sort! Why *don't* you fellows wash your hands, why *don't* you keep your dishes clean; a brush don't cost much, and water 's cheap? When I ask this they look amazed, and even hurt, and say something this way: "Oh, it 's only a proof, and shows all I want." Now and then I inquire, "Do you ever tone in your developing or fixing dishes?" Again comes the look of surprise. "Why not?" say they; "what is the use of having so many dishes?"

Now this is a difficult case; how can you make a man see the advantage of always doing careful work, when he takes no pride in doing good work, but is quite satisfied even with the most spotty and bilious-looking prints. Usually he won't own that he alone is to blame; "the paper is bad"; "it is because he used combined bath," or *vice versa*,—anything but himself.

This man certainly lacks "bromide of brains," and the difficulty is to show him this, in a way that will convince him without running any risk of one's own head getting broken.

It makes it all the more difficult, that some of these men now and then turn out good work. This makes the case so much harder to cure, as, when you argue with the man on the errors of his way, he suddenly springs a really nice print and says, "What 's the matter with this?" This proves that my title of "CARELESS" for these men is the right one.

Now come the last, those who have raised our art to its present high position and will go on raising it higher and higher.

These are they who *can*, and *do*, turn out first-rate work; patient, all the time reaching higher, doing their best to improve their work year by year. These are the men in whose footsteps it is good to follow; for, be sure, no matter how good their work is, you can come very near, even if you cannot beat it. Remember, however, one thing! to do good work needs much care, much patience, many a failure; don't forget either, you to whom success seems so far away and unattainable, that the most successful of us have gone through just what you have. Don't give in; let each failure make you try that much harder; endeavor to discover what caused that failure; once you know *why* you failed, you are on the way to success.

NEW YORK CITY IN SUMMER.

By Walter Sprange.

FROM the earliest approach of spring until summer has well matured, a general stampede from New York city to—almost everywhere else, seems to be going on constantly at all its places of departure, and this steady exodus continues until the comparatively deserted appearance of its avenues and streets, up-town, presents incontrovertible testimony to the fact that the metropolis of the United States cannot truly be classed as a popular summer-resort. And yet those who remain in that city, and those who visit it during the summer months, are not by any means subjected to all the ills that flesh is heir to in hot weather. In fact, as a place of summer residence, New York city will compare more than favorably with any of the extremely limited number of places in the United States which are really so suitably equipped for the comfort of visitors during the heated term that they can truly be called "summer-resorts."



Brooklyn Bridge

Only those who have been abroad, and have visited foreign watering places, lake, and mountain resorts, can fully appreciate how sadly deficient American resorts are as compared with them. The shortness of the summer season in the States has, no doubt, much to do with this; and then, of course, it requires time and outlay to suitably lay out and substantially equip any place to the degree essential to actual comfort. When one thinks over the prevailing noisy, wooden piazzas which surround most of the American summer hotels, with wooden steps leading direct to pebbly gravel paths and shadeless dusty roads, the dearth of entertainment (not excitement) and the rush when serving

meals to guests seated at closely packed tables in hot,over-crowded dining-halls, and compares all this with the rest, quiet, and substantial comfort that may be obtained in New York during the summer months, one cannot help admitting that the latter place has the preference.



A Harbor View

New York is a very clean city in summer; it enjoys pure air from all quarters—especially up-town on either side of Central Park,—and its facilities for reaching all points of interest, cheaply and rapidly, cannot be equalled. At most of its hotels liberal arrangements can be made for excellent accommodations either on the European or the American plan, if one desires to make a visit of a week or more in summer, and at all the hotels a varied cuisine, served leisurely at separate tables, with polite attendance, can be relied upon. If one is alone that is perhaps the best arrangement to make, but, for two or more persons who desire complete rest and perfect quiet, and also to enjoy the unrestraint of home-life, plenty of unoccupied, furnished flats can be found on the west side, up-town, to select from. Most of these flats are well furnished with every necessary for housekeeping, and many of them can be rented in the summer, by the month, and at greatly re-



The Elevated Railroad



A Foot-path in Central Park

duced rates, and truly those who can remain in New York for a month or two in summer cannot enjoy life better than in one of these up-town flats. Although arrangements can be made with the tradespeople who call at them daily for orders, those who enjoy making little excursions out, by doing their own marketing, can save money, and very often make a better selection in the immediate neighborhood. The variety and quality of fish, flesh, and fruit, that can be obtained in these up-town markets is no less astonishing than the very reasonable prices asked for them.

With a hand-camera for a companion one cannot fail to find subjects for exposure, no matter what class one desires; for New York city contains all kinds. From the Battery one can command an extensive and unobstructed view of the harbor which abounds in marine studies of all kinds; from floating railroad trains, elevators, lighters, and barges, to foreign and domestic steamships and sailing craft of every conceivable construction.



A Subway, Central Park

It is only a few minutes walk from the Battery Park to the famed Brooklyn Bridge across the East River, under which sailing vessels can pass at high-tide without lowering their masts. The bridge, and

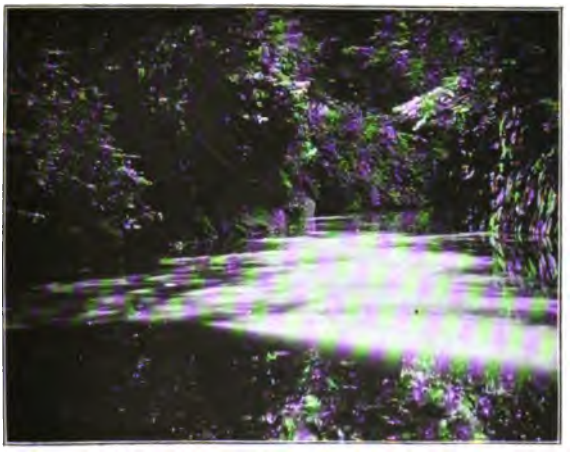
the views to be obtained from it, are worth at least a dozen plates, and Brooklyn itself contains numerous objects of interest, many of them being in the immediate vicinity of Plymouth Church, in which the late Mr. Beecher preached. Then those two beautiful spots, Prospect Park and Greenwood Cemetery, can be reached by the electric cars from the bridge, and abound in interesting subjects and should not be omitted.



The Cave, Central Park

The elevated railway in New York, which is considered such an unsightly object, in warm weather casts such a refreshing shade from the heat of the sun that the avenues along which it runs are preferred by pedestrians as a rule: hence they have become the principal shopping centres.

But it is in Central Park that the camerist can find the picturesque, and of a character and variety to be seen nowhere else. Of course it has its memorial-statues, broad carriage-roads and winding saddle-paths; but the camerist is not always in search of such subjects. It is the numerous shady walks and little pools of water that most please the artistic eye, and call for the exercise of latent talent; and, if one will



A Pool near the Cave

take time and search for them, many unique subjects may be found.

The Subterranean Cave is worth a visit; no doubt by the aid of a flash-light better definition could be obtained than is given



Sheep at Pasture, Central Park

in the illustration of it accompanying this article. There is a very weird pool of water adjoining the cave which is worth the experiment of a time-exposure; the rocks there afford an excellent rest for a hand-camera.



Lawn Tennis, Central Park

No heavy traffic is allowed in Central Park, and, in order to accommodate heavy vehicles, subways have been constructed across the park east and west. In these subways many excellent negatives can be obtained of the

massive foliaged arches and various other points of construction, as well as of the men, horses, and vehicles as they come and go.

The Museum of Fine Arts and the Zoölogical Collection in Central Park, as well as the Natural History Museum, across the avenue on the west side of the park, all abound in subjects of their various classes, and permission can be obtained to photograph in all of them.



A Brook; North Side of Central Park

Many especially fine studies of sheep at pasture in the park can be made, because these timid creatures seem to be accustomed to being approached, and unconsciously pose, undisturbed, while pursuing their natural avocation.

The game of lawn tennis is enjoyed on a superb stretch of level sward on the east side of the park all through the open seasons, and a golf link has been added recently. The latter game affords good figure-studies; but, of course, they should only be made with the consent of the subjects of them.



A Corner of Harlem Lake

The north end of Central Park contains much rugged scenery and is full of surprises. The little brook which pursues its way through the rocks from Harlem Lake, and the lake itself, are

both very picturesque. In fact there are so many charming little bits of nature in all parts of Central Park that months could be spent in it by the true amateur photographer with pleasure and profit. It is true that nearly all of Central Park is of artificial construction, but, since the park was originally completed, nature has been permitted to have full sway unmolested, except here and there to assist in her work, and, as one becomes more and more venturesome in roaming the tortuous paths, additional secluded nooks and unique spots will constantly become revealed.



At Coney Island

After one has had a surfeit of studies in Central Park there are still the Bronx, Morningside, and Riverside parks to visit, the Harlem, Hudson and East rivers to explore, besides numerous harbor resorts. Coney Island, with its democratic surf bathing and colossal eating and drinking establishments, should not by any means be neglected, especially when the need of relaxation becomes apparent; for one is sure to find it there in summer.

BROMIDE PAPER, AND ITS SUCCESSFUL TREATMENT.

By Frederic G. P. Benson.

I WAS returning home the other day from a short photographic outing, and an amateur photographer joined the train at a roadside station. Naturally the conversation turned on photography, and among other things the fact was elicited that he had always used the same brand of plates, never tried any other developer than pyro-ammonia, and that P. O. P. was the only printing process with which he had any practical acquaintance. (Incident No. 1.)

A correspondent writing to one of the photographic papers a



Photographed by F. W. GUERIN.
Engraved by
PHOTO-CHROMOTYPE ENGRAVING CO.,
Philadelphia, Pa.

THE DIZZY WHIRL.

few weeks ago complained that his efforts to produce prints on bromide paper were a total failure, his prints immediately on the application of the developer going black all over. He detailed his method of procedure, and said that he exposed the print to daylight for five or ten minutes and conducted the operations of putting the paper in the frame and development in an ordinary room! (Incident No. 2.)

I had not decided on the topic for my contribution to the ANNUAL, and these two incidents, trifling perhaps, led me to think that a short article on "Bromide Paper" might be useful to those who, on the one hand, have never tried it, and in no less degree to those who have failed to produce successful work by this process.

Bromide paper is made in different varieties of surface--rough, smooth, glossy. The printing is done by artificial light, and the image subsequently developed as in negative making; the emulsion with which the paper is coated, being, for all practical purposes, identical with that used for negatives, the material difference being that it is much "slower" than even a "slow" plate; the illumination of the dark room can, therefore, be of a brighter character, and one thickness of canary medium will in most cases be found quite sufficient. It is not advisable to use a ruby light as the progress of the image cannot be so well judged, and the exact point at which to stop development is rendered more difficult of determination. The exposure is made to a gas flame, holding the printing-frame about 18 inches away. The length of exposure is dependent on the following factors:—(1) the rapidity of the paper; (2) the density of the negative; (3) the distance of the frame from the source of light; (4) the intensity of the light used. Factors 1, 3, and 4 may be regarded as fixed quantities, leaving only the density of the negative to be dealt with, and a few trials will soon determine the exact exposure required, which may be anything from three or four seconds up to a minute. As an approximate guide, using an average negative held two feet away from an ordinary gas-jet, anything between 15 and 20 seconds will be found to give good results. The developer I recommend is Amidol, a formula for which I gave in a contribution to a previous volume of the ANNUAL, but which for the sake of completeness I repeat.

Sodium sulphite	2 ounces
Potassium bromide	20 grains
Water	20 ounces

For use take 2 ounces of this solution, which will keep for a considerable length of time, and add at the time of using 5 grains amidol: the formula is simple; the results cannot be surpassed, and I have no hesitation in saying that it is the best that can be

used for the purpose. The proportion of amidol can be increased or diminished to suit any special requirements, remembering that increase of amidol means more rapid development, and that less tends to reduce the strength of the prints; the quantity given, 2½ grains to the ounce of stock solution, will be found to meet most cases, the exceptions being exceedingly rare. With a correctly exposed print the image should commence to appear in about half a minute, development being complete in from three to four minutes, and the exposure should be regulated so that development occupies about this time; more rapid development tends to flatness, and if prolonged the contrasts will probably be too great, while if unduly protracted stains are most likely to occur. The correct exposure can be easily found by exposing a trial-slip or two of paper, and no modification of, or tampering with, the developer should be attempted if the best results are desired. The same developer can be used for five or six prints in succession, but the mixed solution does not keep, and should be made up as required. After development the print should be rinsed in three changes of water and then immersed in the fixing bath, (Hypo, 3 ounces; water, 1 pint,) for 15 or 20 minutes, and subsequently washed in running water for two hours.



The River Ure, near Ripon

And now, a word or two with regard to the negatives. The fact that prints, of a sort, can be gotten on bromide paper from negatives which are too poor for any other process, has given rise to a very general opinion that anything is good enough for bromide; and perhaps the disrepute in which this process is held by some workers is due to the fact that it has been used when all other papers have failed, and has consequently had to bear the odium which should have been laid on the fogged, over-exposed

and under-developed products which form, alas, such a conspicuous feature in the early experience of most amateurs. On the other hand, the under-exposed, over-developed negative, without detail in the shadows, and with the high-lights all blocked up, of which the hand-camera yields such a prolific crop, is equally useless as a means of obtaining satisfactory bromide prints. Briefly, the negatives for this process should be fully exposed, of medium density, and preferably not stained or fogged. It might be that this article would be more complete if I dealt with the faults and defects which arise in working bromide paper; but truth to tell, I have never, since using amidol, met with any that did not owe their origin either to incorrect exposure, or a specially poor or unsuitable negative, bearing in mind, of course, that in this process the old, proverbs, that "you can't make a clean pudding in a dirty dish," nor "manufacture a silk dress out of an elephant's tusk," are specially applicable.



Fountains Abbey, near Ripon

Just one point may perhaps be worth mentioning. Bromide paper keeps fairly well, but it has its limit even in this respect, and stale paper is very unsatisfactory stuff to deal with, good results being out of the question with it. The defect may be recognized by the edges of the print, which have been protected from the action of the light by the rabbet of the printing-frame, being fogged during development. If not very pronounced, this fog may be removed by the application of a clearing solution made as follows: saturated solution of cyanide of potassium and iodine in alcohol, equal parts, diluted with four or five times its bulk of

water. This preparation must be used with great care, not only on account of its extremely poisonous character, but because it is very energetic, and, like fire, "a good servant, but a bad boss," and in removing the fog will cause the picture to bid the paper a quick farewell. Nevertheless, if used carefully, and with discretion, it is a most valuable aid in securing clean, bright prints on faulty paper when one is unfortunate enough to get a packet which has had a long sojourn on the dealer's shelves, or in his own cupboard.

THE PREPARATION OF PLAIN SALTED PAPER FOR SILVER PRINTING.

By John R. Clemons.

THIS was the first kind of sensitized paper used in this country, with the exception of iodide of silver paper, which was used for making paper negatives, but I think it was short-lived. Mr. T. F. Hardwich published a manual on *Photographic Chemistry*, and sent it forth on Wednesday, September 26, 1855, on the iodide process, and in the same year I was salting paper with chloride of sodium, using the salt very strong; all the paper was submerged by running it through the solution, and suspending from a line to dry. There was no gelatine or any other material then used, but shortly afterward I was called upon to prepare a special lot of paper which should contain gelatine in the solution. The author of the formula was an artist who claimed that it kept the print and the subsequent coloring more on the surface. Now, however, I never use it; as, in the course of time, I found the paper had a tendency to turn slightly yellow with age. And I have since found that in all makes of paper where gelatine is used to any great extent, the prints are apt to change rapidly; the cause is, that the free nitrate of silver is held very tightly in the structure of the gelatine, and the elimination requires very long washing. The safest and proper way is to convert the free nitrate of silver into chloride of silver, which can be done by immersing the prints in a pickle bath containing one ounce of table salt (chloride of sodium) to one gallon of water. This is to follow the toning and will arrest it at any stage, after which, of course, the hypo has only to dissolve the chloride of silver, which is the only free salt in the paper.

WHEELING A CAMERA.

By James Reüel Smith.

IN the International Annual for 1897, it was suggested that the camera be strapped to the handle-bars of the bicycle, and this was found quite satisfactory for short excursions, but for carrying a heavy camera constantly, it is, for many reasons, preferable to attach it at the rear of the machine, and a few words about a simple device that has carried a twenty-pound outfit four thousand miles, over rough country roads, through woods, up hill and down dale, without breaking a single plate, and with no inconvenience or increased fatigue, may perhaps add a few members to the small band that go wheeling with cameras; for it is surprising how few bicycles are seen equipped with them.

The general reason for not carrying a tripod camera seems to be that it is too weighty.

This, however, is only another of the many photographic fallacies, for twenty pounds extra weight on a bicycle is hardly appreciable, and for the first few days the rider will be frequently looking behind, under the impression that the load must have slipped its fastenings and fallen by the wayside.



It is not necessary to have a so-called bicycle-camera; any old thing still in commission is as readily portable with the simple device pictured herewith.

The upright part is 6½ x 5½ inches, and the base 4 x 5½ inches.

It is made of a thin piece of sheet iron strengthened by lapping it all around, except at the top, over a steel wire. The sheet is then bent into the bracket form.

The four slits are made by cutting three sides and bending the metal back to form a round edge on the fourth side of each slit;

these rounded edges are the centre of one the lower slits and the top ones of the upper slits.

The detached wire is twelve inches long, bent in the middle, and turned over two inches at the ends.

This wire is hung on the top bar in front of the saddle-post, and the bracket is suspended to the wire by the upper slits.

The bracket is enamelled the color of the wheel's frame, and two pieces of rubber tubing eight inches long, painted to match, are slipped over the backstays to keep them from being scratched.

The camera, plate-holders, tripod, top, screw and what not, are packed snugly in an ordinary telescopic bag, which is buckled up with the usual two straps and set on the bracket. The ends of the strap are carried forward and tied in a reef-knot in front of the saddle-post.

For additional firmness, a strip of rawhide 22 x $\frac{3}{16}$ inches is passed forward through the upper slits, wound once around the backstays and tied in a bow-knot.



In a New York City Garden (1898)

Another strip of rawhide 72 x $\frac{3}{16}$ inches, with a bowline at one end, goes through the lower slits and is wound around the backstays like the upper piece; the straight end is then brought backward around the bag, passing under and around a small flat band of canvas sewn in the centre of the bag behind, to keep the

rawhide from slipping, and then through the bowline upon which it is tied with a slip-knot.

Over the back of the bag is hung a folding tripod, its carrying-strap passed once around the saddle-post.

Two jerks releases the rawhide slip-knot and the reef-knot, and the bag is free, and in half a minute the remainder of the apparatus, save the rubber tubing, can be removed from the wheel.

The rubber tubing, painted the color of the frame, is unobtrusive but can be easily done away with by lining the upright of the bracket with rubber or leather.

Any sheet-iron worker can make the bracket in half an hour, for twenty-five cents, and the rawhide strips are found ready cut at machinery belt-lacing houses. These strips are very strong and tough, and as pliable as string, and neither cord nor leather can be substituted for them; the strongest cord will not stand the strain more than a few hours, and leather is too bulky to make the short turns and lie flat.

If the camera bag is long, it will be awkward to mount from the axle-step or from the pedal, but easy to mount from the curb, or from the ground, by tilting and straddling the wheel soldier-fashion.

As the outfit is carried practically with no effort, one may ride a whole day without using it, and yet have nothing to complain of in the way of extra trouble.

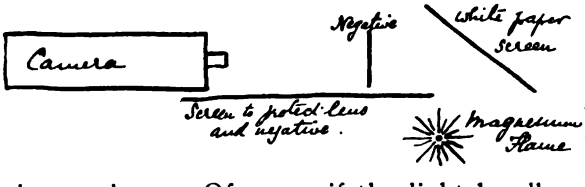
The bag protects the camera against rain showers, and the equipment is so easily installed that the lament of the boy who saw so many queer things in the woods when his gun was at home, need seldom be that of the camerist who goes wheeling.

ON ENLARGING FROM SMALL HAND-CAMERA NEGATIVES.

By Robert J. Hillier, M.R.C.S., L.R.C.P.

SINCE the use of hand-cameras has become so general, the practice of taking pictures of a small size, and subsequently enlarging from the negatives thus obtained, has become extremely popular. This procedure has very much to recommend it, especially if the photographer be a cyclist, in which case he naturally wishes to reduce the bulk and weight of apparatus carried as much as possible. Enlarging cameras, also (not lanterns), are so cheap now that anyone can procure one, and the necessity for expensive condensers is removed by the method of illumination described below, and no other apparatus is

necessary. As far as I can see there are but two objections to be urged against it (enlargement). The first is the loss of definition due to too great enlargement; the second is the method of illumination to be employed in enlarging when daylight cannot be used, as is frequently the case. The first objection is easily met if one makes it a rule not to enlarge to a size more than double the diameter of the original negative in each direction. Any lens which is worth buying should give perfectly good definition for that size, probably with full aperture, and certainly with a suitable stop. The second objection is at first sight more difficult to surmount without the aid of somewhat costly apparatus, but I have lately devised a method (probably someone will tell me that it is very old) which requires no outlay whatever for apparatus, and which in my hands has given excellent results. As illuminant I use magnesium ribbon, and I find that it requires about two feet of it to be burned for a correct exposure on the Ilford Rapid Bromide Paper, with a negative of average density free from stain. The negative is of course placed in front of the lens of the camera, and the image carefully focussed on the focussing-screen, (a lamp placed behind the negative will do for this) and brought to the required size by moving the negative nearer to, or farther away from the camera. Accurate focussing having been accomplished, the bromide paper in the dark slide having taken the place of the ground glass and the cap being on the lens, the next thing to do is to place a wooden screen covered with ordinary white paper (not glazed) a few inches behind the negative and at an angle of 45° to the front of the camera. If now the magnesium is burned a few inches from this screen, and the ribbon is kept on the move all the time it is burning, and exposure is made at the same time, an excellent illumination will result. There are two very important precautions however to be taken. The first is to screen the negative, and also the lens, from the direct rays of the burning magnesium; this can easily be done by means of another screen. The second is to lower the ribbon as it burns so that the light may be always approximately opposite the centre of the paper screen. The whole arrangement can be made much clearer by plan as above. Of course if the light be allowed to fall directly on the lens or the negative, hopeless fog will ensue.



An excellent carrier to keep bromide-paper flat in the dark slide may be made thus: Get some self-adhesive rubber strapping from the chemist. The surface of this is always sticky, and if two narrow strips of it be glued by their backs to a piece of wood



Photographed and Copyrighted, 1898,
by W. N. BRENNER.
Engraved by
BOSTON ENGRAVING CO.,
Boston, Mass.

TO-MORROW'S LESSON.
A CONVENTION PRIZE WINNER.
P. A. of A., 1898.

about the size and thickness of the plate for which the slide is adapted, one strip being at one end of the wood and the other at the other end, the paper, if it is pressed down on to the sticky surfaces of these strips, will adhere quite firmly enough to hold it in position, and can be easily stripped off afterwards.

ORTOL.

By J. Joé.

(*Translated by Henry Dietrich.*)

AMONG other new inventions the year 1897 has given us several new developers, which are of interest to the professional photographer. One of these is the new developing substance, Ortol.

This substance, which is represented as a white, light powder, soluble in water, possesses an energetic developing power and is quite similar to the hydrochinon developer in its action, as to strength, clearness, and density; the image, however, appears somewhat quicker during development. If normally exposed, the image will not appear at once, but gradually, and the development does not proceed so rapidly but that it can easily be controlled.

The developer is made in two separate solutions and offers thereby the advantage of easy regulation. According to the formula of the manufacturer, one solution consists of water, ortol, and its preservative with bisulphate of potassium, while the alkali solution, besides the usual caustic soda or soda, contains sulphite of soda, bromide of potassium, and fixing soda solution. The latter is for the purpose of greater clearness. To effect a slow and soft development, the mixed developer is diluted with water. Bromide of potassium solution acts as a retarder, even in small quantity, and the character of the negative can be changed by increasing the quantity.

The solution is clear and without color of any consequence and the film of all negatives developed with ortol is also clear and pure, and the silver precipitate of a good black coloration. For this reason the ortol is excellently suitable for developing bromide of silver paper for contact prints as well as enlargements. If properly lighted, the picture is of very good modulation, faultlessly clear, without coloration, and of an agreeable black tone.

The developer used for this purpose is correspondingly thinner than for the regular negative process. The normal developer may be diluted with two to three volumes of water, and if necessary

some drops of bromide of potassium solution may be added. The developed prints are fixed in the acid fixing-bath in the usual way.

Ortol can also be employed to very good advantage in the diapositive process, and strong, clear, and well-modelled pictures can be obtained with the same. If properly treated, the color of the picture will be an agreeable black and the film shows no coloration.

Good negatives may be developed in one solution, and a plate somewhat over-exposed can be developed to advantage with a developer that has already been used. The printing capacity of the negatives so obtained can easily be judged.

NEEDS OF AMATEURS.

By Robert E. M. Bain.

THE amateur photographer is constantly reminded that his needs are fully supplied by the modern literature and the various societies organized to promote the art-science. But he, or she, is quite aware of the fact that there is something essential lacking in all of this; that the something is tangible, but not expressible. Hence the want remains: and the tyro wonders why, with all the facilities offered, he cannot make the improvement desired, which would also carry with it a saving of time, patience, and money. The fact is, our societies are not practical so far as the beginner is concerned, and he must rely on such information as he can obtain from individuals, and not from the society as a body. He needs not only to be told what chemicals to mix, and the proportions required, but must also be told why these are used, and what the function of each ingredient is, and its relation to the entire solution. Not only that he must add bromide, but just what that substance does to the chemicals in the film, so that he may be the judge himself as to the action as it progresses. The action of all chemicals used in photography is well known to those expert in handling them, and yet the beginner is not enlightened as to their *properties*, being simply told to pour certain quantities over the film by red light, and if (?) his exposure is correct, and if (?) the chemicals are good, and if (?) the light has not fogged the plate, and if (?) he does not over- or under-develop, his picture will probably (?) turn out all right. The journals (all of them) enter into long discussions as to the advantages of pyro over metol, or some other element; and the tyro, being so far behind in this class as to render it Greek to him, concludes that he must be dense, as he cannot comprehend the matter discussed. No journal seems willing to have a beginner's department, where ques-

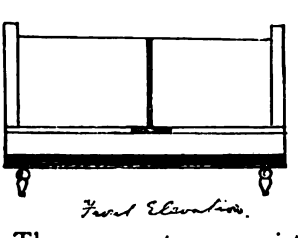
tions may be asked, and the more simple problems of photographic chemistry be discussed with freedom. There should be able articles for the more advanced, I agree, but why hold back those beginning the work by ignoring their needs? Give them a show, and they will, if ambitious, be equal to the best in half the time now required.

Let societies organize classes on nights other than those set apart for regular meetings, and dedicate them to the beginner, and I have no doubt but that they will be appreciated by those for whom they are formed, to the great advancement of the club in numbers, and still greater satisfaction of those benefited. We all need encouragement at the commencement, and I say with confidence, that if our clubs will take the matter in hand the ranks of those who "push the button while some one else does the rest" will be greatly reduced.

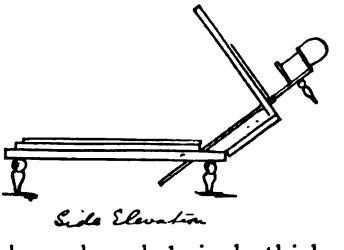
AN APPARATUS FOR SHOWING STEREOSCOPIC TRANSPARENCIES.

By Eli Hirst.

PERHAPS there is nothing in photography more pleasing than a good stereoscopic view, and best of all a stereoscopic transparency. But there is difficulty in showing stereoscopic transparencies to advantage, unless they are backed with a piece of fine ground-glass, and even then they cannot be viewed by artificial light without considerable inconvenience. I have lately been making a series of transparencies with plain glass covers (which are cheaper than ground-glass, as old negatives cleaned and cut down will do well for the purpose) and I have made a little arrangement for showing them by daylight or lamplight which readers of the ANNUAL may be interested to know about. It is merely an adaptation of the principle of the retouching desk but it serves the purpose admirably. The subjoined sketchs will show how it is built up :



Front Elevation.



Side Elevation

The apparatus consists of a base-board $\frac{1}{8}$ inch thick, 9 inches from front to back, and 12 inches from side to side. On

this is placed a mirror covered with a piece of ground-glass for diffusing the light reflected by the mirror. The continuation of base-board (2½ inches), as will be gathered from the drawing, is movable, being attached by two hinges, and springing from this are two uprights, each 6 inches high. The uprights are grooved to receive a piece of plain glass, against which rest the transparencies, these being dropped on a projection provided to receive them as shown in the sketch. In the centre of this projection is an aperture to receive the stem of the stereoscope, and there is a corresponding aperture in the base-board to allow for focussing, whilst the hinges on the base allow of the view being placed at any required angle to secure the best lighting. Down the centre of the plain glass which supports the transparencies it is advisable to put a narrow strip of black paper so as to register the view with the lenses of the stereoscope, and the effect is heightened if a mask hood be made of stout black paper to keep all light from the eyes of the sitter except that which comes through the transparency.

TWENTY THOUSAND DEAD MEN.

By Henry Erle Cooper.



O the average photographer the opportunity to photograph the "unusual" seldom occurs, and when it takes the form of the bones of twenty thousand dead men, it is desirable to take more than usual trouble to obtain a photographic record worthy of the subject, whatever the difficulties that may present themselves.

Lying in a vault beneath Rothwell Parish Church, Northamptonshire, are piled, rows upon rows, in regular but ghastly order, the bones of innumerable men. For centuries they have grimly stared at wise men, antiquarians, archeologians, and others from the half of Europe, who, attempting to prove their origin, have been forced to make shift with mere conjecture.

The number of men represented by these bones defies exact computation; some declare thirty thousand, others no more than ten thousand; but here comes in the value of photography, for although unable to divine the number, it can assist in permanently recording the appearance and probable quantity. This is a valuable service, for unfortunately the bones are gradually decaying, owing to the action of air and the damp. When first discovered, accidentally, by excavation, nearly a century ago, it is said they

reached to the top of the groined roof. Now they are but three parts up the walls, and in another hundred years doubtless they will be still less.

Lying beneath the chancel of the church, with not a single ray of light entering the vault, they present no easy task to the photographer, so that artificial illumination is perforce a necessity. This resolves itself into the magnesium-light as being the best and most effective. The difficulty is that, owing to the lowness of roof and the length of the vault—over twelve yards—it is no easy task to properly illuminate the far end.

This is no uncommon difficulty with magnesium powder, for whilst near objects will receive their full share of the light, anything beyond a certain radius fails to be affected, unless the light is of a most intense character. A device which will assist in such cases is to place six inches behind the lamp, a mirror of good dimensions, which will materially increase the power of the light; any other form of reflector will be of service, although none is so effective as the mirror, owing to its light-reflecting qualities.



In photographing this vault a difficulty is met with which forms one of the principal drawbacks to the magnesium-light. I refer to the smoke given off during combustion. Owing to this it is practically impossible to made a second exposure. This renders it the more important to absolutely insure the success of the

first exposure, for once the vault is filled with the smoke a long interval must elapse before it is clear again.

The best way of making certain of a good negative is to employ two cameras, varying the stop and rapidity of plate in each, and burning the magnesium in liberal quantities, to make certain that the light is strong enough. If this is done a good negative can scarcely fail to result, that is, presuming an efficient flash-lamp is used. Among the various makes on the market at present there are many that are satisfactory, but there are some which are failures. These chiefly fail owing to the smallness of the flame, or the equally serious fault of a bad arrangement by which a large portion of the magnesium is wasted. Such lamps should be avoided for all subjects where a powerful light is of the first importance.

Regarding plates and lenses, little need be said other than that the plates should be rapid and free from fog, whilst the lens should be capable of working sharply at a large aperture, and of giving what is of equal importance—good depth of focus.

Often in flash-light work some daylight or other convenient illuminant is available for focussing; but in the vault in question such assistance is absent. The best plan, therefore, is to place a number of lighted candles at various points, focussing for the flame and dividing the focus if the lens fails to give full depth of focus. The candles should be removed before the exposure is made.

In the vaults at Rothwell, sectional views of the different features, although interesting, are difficult to get after the first exposure, owing to the smoke which disperses slowly. A number of the more striking skulls and bones can, however, be brought up into daylight, where they can be arranged in groups suitable for the camera. To the visitor at Rothwell these bones are a source of wonder and conjecture. It is proverbial that dead men are reticent about telling tales, nevertheless if one goes over the evidence at hand there is little difficulty in coming to a general conclusion, although half a dozen different theories claim attention. The number of men represented is probably about twenty thousand. The size of the individual bones, indicates men of more than the average size and strength; whilst the fact that they are nearly all full-grown males, and that many of the skulls have large wounds and fractures in them, forces one to the conclusion that they are the sole record of one of those fierce and long-continued fights between Pitts and Celts, or Saxons and Normans who struggled together for the conquest of England.

Some have suggested Naseby, where Charles the First was defeated; but the number of skeletons is too great, and the date of the battle too recent for this surmise. It is evident, too, on a close examination, that the bones have lain in earth previous to their

being stacked in the vault. Moreover, behind the bones on the wall are faint traces of a fresco painting said to represent the Resurrection. This would point to the fact that the vault was originally an underground chapel, and that the bones were placed there by the monks from the neighboring priory, who have left no trace of their origin behind.

And so to-day they stare grimly at the photographer who attempts to surmount the photographic difficulties they present, and put before the visitor the perplexing query, "Whence came they?"



A NOTE FOR NON-SKETCHERS.

By "Verton."



E are often advised by our compeers in photography that it is most advantageous to ourselves and our work, if we set out on a tour of selection with our note-book and sketch-block in hand, prior to a photographic ramble in search of likely subjects.

The argument—that it is well to have the picture previously determined, and thereby save time when the actual view is to be taken—is decidedly good, and written hints as to the most suitable time, best scheme of composition, arrangement, and lighting, together with other incidental matters are, without a doubt, invaluable; but while we are all able to take a note or two, the advice we so often hear, viz., "that we should make a sketch," is, in the majority of cases, lost upon us, owing maybe entirely to our inert inability to make even the roughest drawing, or, in fact, to use a pencil at all. Knowing this we venture to offer to our non-sketching readers the alternative note herewith.

Last summer, while in the south of Sunny Devon, we were informed of a locality that was a veritable elysium for the camera; but we were strongly advised to have a day in the district without the usual paraphernalia—a day to look round, as it were —to select, compose, and arrange for our more earnest intention. This advice we took, as did we also our note-book; but in place of the "sketching-block" substituted that inseparable companion —our pocket camera—and off we started.

Now the particular camera we used carries plates of a small size and has the advantage of a full-size ground-glass removable focussing-screen. Well, having selected our subject, and, by a handy exposure meter, having made a test of the light intensity, we made and duly *noted* details of our exposure, light ratio, time of day, and other memoranda in our pocket-book. Seeing that we had six little dark slides, we duly recorded six little views. Here comes my point: When we got home we developed our six little plates with our note-book in front of us. We were, during development, able to see where we had erred. In one was present, "over-exposure," in another, the arrangement of subject was poor, and so on.

Thus, we maintain that our little camera was more useful to us than the finest sketch, as it showed us how we might have saved a plate here and there, or how we might so modify our developer as to produce the desired result.

Armed with the errors of this general survey, we "went for" our subjects with our regular equipment and improved knowledge. Having compared the light (by the exposure meter) with the light of the previous time, and having allowed for any slight variation, we estimated our exposure and obtained satisfactory results, as proved when developed according to our altered developer suggested by our previous scheme, and as the modification of data demanded.

Thus, we not only obtained the advantage of previous note taking, but we were also able to go about the development in a more scientific way than could we have done had we only made a sketch. This then is our alternative note to non-sketchers, and we hope the trial of the preceding will better impress its utility upon photographers in general, and non-graphists in particular. One point further and we finish. It helps not only the selection but aids in development of the final picture, and although it may be said that these small plates cost money (yes, one shilling for eighteen plates), yet they were the means of saving many of larger size and greater expense last year, and we hope our readers who cannot wield the pencil, will take our advice, and reconnoitre their favored locality with a little unobtrusive instrument, in place of a sketch-block, the use of which is not within their power.



Photographed by J. E. HEISER.
Engraved by
BOSTON ENGRAVING CO.,
Boston, Mass.

THE COCHRAN MILL.
Built in 1812 on the banks of Indian Creek,
near Hamilton, Ohio.



LONG-FOCUS LENSES AND CAMERA IMPROVEMENTS.

By H. W. Hales.

IN looking over the photographic practice of to-day, one cannot help noticing the improvements in photography in general, and especially in landscape work. While a few years ago the amateur and even the professional were contented with bald-headed skies, houses that seemed ready to fall over backwards, and landscapes that seemed to take in all creation, this is now all changed.

Such work will not stand the test of the critical artist or worker, and hence we find a very great improvement all along the line, so to speak. One of the chief reasons for this is the more general use of long-focus lenses and long-bellows cameras, and also the more general use of the level and double swing-back; and when negatives are taken with these and a cloud-shutter or ray-filter used to get cloud-effects, the results certainly speak for themselves. There are yet many, however, especially amateurs, who still use lenses of too short a focus, and if these few lines can assist or give them any useful hint, they will not have been written in vain. In taking a photograph or picture of any subject, the nearer we can get to the impression or view as seen by the eye, the more pleasing in general will be the result. Therefore it is, that the use of short-focus lenses, which distort the perspective, short-bellows cameras, and those without a swing-back, are a great disadvantage to those who wish to get the best results. For really good work it will be found that a lens, the focal length of which is one and one half times or twice the length of the plate used, is really a necessity; and for distant views of mountains and other scenery it would be better longer. Another advantage of long-focus lenses is, that if the photographer wishes to make a picture of any small natural object—such as a bird or small animal that cannot be approached very closely—it can often be obtained without the trouble of enlarging; whereas with a short-focus lens this would not be possible.

If the camera is a large one, it should by all means have a double swing, and, if possible, also, a level. There are often positions where the operator is working up-hill or down-hill, often being obliged to stand on the side of a steep hill or declivity to get some particular view. It is in such cases particularly, that the eye is apt to be deceived, and it is then that the level and swing-back come in very handy, and their careful use adds very much to the picture, to say nothing of the saving of time and temper to the photographer.

A REMONSTRANCE.

By Clarence Nelson Whittaker.

TO the real artist nothing so jars upon his sensibilities as man's attempt to improve the work done by the Almighty, and to turn to financial account some of His grandest pieces of handiwork.

Yes, we, as a nation, are progressing rapidly, but our appreciation of beauty and grandeur is not keeping pace with our other attainments. A month spent in and around Manitou, Colorado, has made plainer to me than ever, this one great truth, and has also shown me how the average American will even deface nature to put a dollar into his pocket.

God, the Architect, has planned domes and spires and parks and streams. Progressive man tries to improve and well-nigh destroys.

What beauty is there in a waterfall when I climb to its summit on stairs made by human hands instead of slowly and laboriously making my ascent in the way provided by the Almighty? How can I admire a magnificent bit of landscape when a turn of the head shows me a large hotel with men and women in summer costumes loitering about it or climbing up and down the near mountain side?

One of the grandest things, to my thinking, is that series of waterfalls in Ute Pass known as the Cascades. But here, at the foot of the descent, is a reservoir from which water is carried in pipes to the village below; man could not govern his desire to turn to some commercial value this superb cataract.

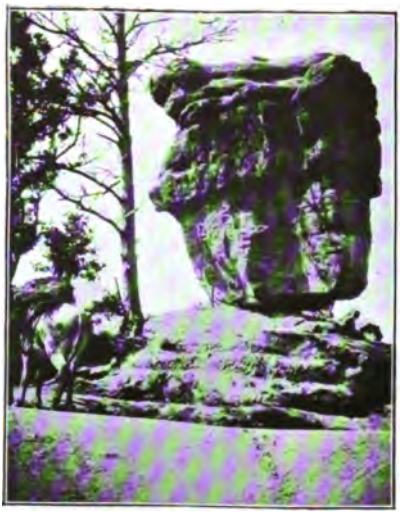


The Cascades Ute Pass, Colo.

Once past this great, box-like concern you find yourself leaping from stone to stone, clinging to the smooth surface of some rock, walking over the torrent on a fallen pine, while all around, tower trees whose bases perhaps never saw the sun. This, though laborious, is restful; one feels as though he were not of man, but of nature.

The water roars around you, telling of unlimited energy; but

after toiling upward, as you sit upon a ledge of granite, a feeling of sweet repose steals over you that could not be felt if you were reclining upon the softest couch in the hotel in the valley.



The Balanced Rock, Garden of the Gods, Colo.

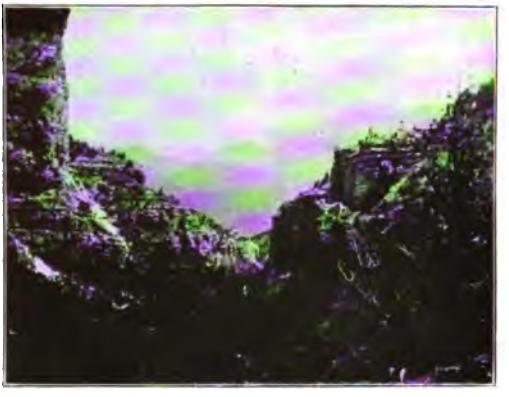
Everywhere nature bears the wounds inflicted by devastating man. The giant boulders in the Garden of the Gods speak hundreds of names in support of this. That garden has been laid waste in the erection of curio-shops, lunch-rooms, and photograph-galleries which blunt the better taste of the lover of the beautiful and drive the artist mad. A lunch-room and a photograph-gallery where you are invited to " Have your picture taken on a burro by the Balanced Rock," stand so near that great rock that they would be crushed to atoms if it should topple over.

No longer may we get down on our hands and knees beside some mineral spring and drink of its cool, refreshing waters; we must now stand in line and descend the stone steps to the iron grating, and there take a dirty glass from the hands of a waiter who fills it from what seems to be a cistern. Last year one of these springs was cleaned and several long-lost articles were found,—eye-glasses, gloves, bottles, tin-cups, pocket-combs, and a pulpy mass of nobody knows what.

At the top of Pike's Peak, not far from the Tip Top house, there is a pile of rocks between a footstone and a headstone, the latter of which bears this inscription:

Erected
in
Memory of
Erin O'Keefe
Daughter of
John and Nora O'Keefe
Who was eaten by
Mountain Rats
In the year 1876.

Why is this? Why do they seek to deface every one of these cosmical attractions? Yes, it pays. The American tourist is a typical American. He likes to see wonderful things; if not real,



William's Canyon, near Manitou, Colo.

then counterfeit, and he is willing to pay well for the privilege. He is satisfied if he has a wonderful story to tell his friends when he returns home.

The stones on this corpseless grave are covered with the names of people who wish to be able to boast that their names can be found on the top of Pike's Peak. Everywhere it is the same. If they do not write their names they break off pieces of Nature's statuary. In the Grand Caverns it has been found necessary to spread a wire netting over the walls to keep the visitors from utterly destroying the stalactites and stalagmites. Thus does man delight to undo in one second the work of ages.

It is a well-known fact that Helen Hunt Jackson, just before her death, asked to be buried on Cheyenne Mountain. This wish was observed by her husband; but no sooner did the great army of tourists learn that the poet desired to be alone in her last sleep than they flocked to the place by hundreds, and it was soon a waste of lunch-boxes, paper bags, and picnic trash of all kinds, and the beautiful marble pillar was hacked and chipped by curiosity seekers until the name was almost obliterated. Then the casket was removed to the cemetery at Colorado Springs.

There are few canyons or passes that you can follow to any distance without finding a toll-gate closed against you, and you learn that you must pay to see the most sublime of the works of Nature.

How depraved is man that he is willing to prostitute her grandest efforts to his own financial gain! These gardens of beauty are for us all, and it is not



William's Canyon, near Manitou, Colo.

the right of man to close them against any one who seeks them as a lover of the beautiful.

In North Cheyenne Canyon this was more than Nature could endure. She sent down such a deluge that road, toll-gate, bridges, and all were swept away. When I visited this canyon no "repairs" had been attempted and it was truly a grand sight. Great trees lying where the water had left them, huge boulders where once a road had been—no stairways by the waterfalls, no lunch-rooms, no toll-gate. Only the work of the Almighty.



Buffalo Rock, Garden of the Gods, Colo.

CLOUD PRINTING.

By Martin J. Harding.

IT is but rarely now-a-days that we meet with any photographs of importance having those glaring white skies that were so generally accepted as passable even at the exhibitions of twenty years ago. And yet with all the possibilities that are opened up by the use of suitable clouds, a series of negatives of which every photographer with any pretentions to a picturesque rendering of his work now makes a point of securing, what a small proportion of successful results are really produced. How often are to be seen brilliantly lighted masses of cumulus clouds far too darkly printed above a landscape or architectural subject with the lighting reversed. Over-printing is a very common fault, and commoner still is the want of care that is shown in the wedding of the sky to the subject. The joining, or rather the lack of proper joining, is frequently only too painfully obvious. Instead of adding distance to the picture, the trees or other objects in the back-

ground are often fairly smothered by the overlapping clouds, which positively project in front of them! Now the object of this paper is not only to find fault but also to point out a very simple means of avoiding the defects above referred to. The usual procedure is to first print the subject, leaving the sky to be afterwards added, but far more natural effects will be obtained if this plan is simply reversed. Having made a trial print of your landscape or other subject, cut away the upper part roughly at the sky line, and, after carefully adjusting the print on the plain glass side of the cloud negative, take a fine camel's hair pencil of thin India ink or neutral-tint and run along the sky line on the glass. Trees or other objects standing out against the sky should be cut away, as they will print out boldly over the sky in the after-process. A print of the desired clouds should then be made, using the trial print as a mask, and moving this slowly up and down within the space of about one inch at the painted sky line until the required depth of print is secured, when a softly vignetted effect along the line will be the result. The cloud negative is now replaced by the subject negative, which will print out correctly over the vignetting, and should not only leave no trace of the process, but the clouds will really appear at the back of the picture in their natural position.

It will thus be seen that I advocate the practice of first printing the sky and then the subject, a method which I have long found to be infinitely superior to that which is usually adopted.

INDUSTRIAL PHOTOGRAPHY.

By Dr. Hugo Erichsen.

THE camera has even invaded the factories and is used almost every day in order to obtain pictures of machinery or other manufactured articles that may be sent to customers at a distance, where the photograph will give them a better idea of the article they propose to purchase than any mere description possibly could. Instead of carrying bulky samples, the commercial traveller now frequently carries with him a neat album containing photographs of the various specialties manufactured by his firm. The use of photographs for advertising is becoming common and the half-tones in the advertising pages of the popular magazines often show that they have emanated directly from the camera. In architecture, too, photography is made use of, to note the advance in building, and the progressive architect of to-day displays a number of photographs to his client in lieu of drawings when it comes to the

choice of an exterior. Ship-builders frequently photograph vessels at different periods of their construction, and railroad companies not infrequently make use of the camera for one purpose or another. In various other fields of industry the camera also proves useful. In courts of law, photographs are admitted as evidence, although lawyers, the world over, asseverate that such evidence is not indisputable. One would naturally think that such an extensive field as is mentioned above would not be neglected by the professional photographer, as it presents so many opportunities to make money, but, on the contrary, most of the photographs at the factories are taken by employees, that is to say, amateurs, who were forced to take up photography because their employers did not know of a professional photographer who was prepared to do their work at a moment's notice. In large cities, men making a specialty of what might be called industrial photography, would undoubtedly do well, and find their services in great demand. The inferior work of the employee would soon have to give way to the professional production. Manufacturers would get accustomed to the idea of calling in a professional photographer whenever they required his services. Moreover, a clientele of that kind could be built up. The professional could put in his spare time by calling at industrial establishments, to show his sample photographs, and in time would be certain of a profitable business. If your portrait business has



fallen off of late, or for other reasons is not as remunerative as of yore, my professional friend, it may pay you to look into this matter. One thing should be borne in mind in catering to this class of trade. Manufacturers care nothing for artistic effect; what they want is plenty of detail. A photograph must be as sharp as you can make it, to please them. You will find time plates better for this class of work than instantaneous ones. For one thing, they admit of greater latitude in exposure, and this is an advantage not to be underestimated when one has to work in all kinds of places, some of which are certain to be poorly lighted. An actinometer will also prove of use. As for lens, it is best to be provided both with an ordinary rectilinear, and a wide angle. Generally the rectilinear will suffice. For bright objects non-halation plates are, of course, to be preferred. Great taste can be shown by the photographer in arranging manufactured articles, prior to the exposure, and this will be appreciated by his customer. In fact, there are many little things about this business that can only be learned by experience, as one goes along, and that will assist in building up a reputation. But once attained, a reputation in this business possesses a commercial value. Even as a side issue, industrial photography would prove remunerative, although manufacturers will naturally give preference to a man who devotes his entire time and attention to this specialty.

ORTOL: A NEW DEVELOPER.

By C. H. Bothamley.

ORTOL, a new developing agent introduced by Dr. Hauff, of Feuerbach, in Germany, may be commended to the notice of all photographers who are on the look-out for a developer that will combine the advantages of our old and tried friend, pyro, with freedom from its more serious disadvantages, and chiefly from its tendency to produce stains and fog. Ortol is an almost white solid, that dissolves readily in cold water, forming a solution with a distinctly acid reaction to litmus. This solution, when exposed to air, alters much more slowly than an aqueous solution of pyro; and if it also contains potassium metabisulphite in the proportion of two parts of metabisulphite to one part of ortol, the solution may be kept for many months in an ordinary stoppered bottle without losing its developing power to any extent recognizable in ordinary practice, and without acquiring more than a yellow color.

When mixed with sodium or potassium carbonate, ortol acts as a powerful developer, but differs from pyro in the practically complete absence of any tendency to produce stains and in its



Photographed by W. H. HOFFMAN.
Engraved by
WEEKS ENGRAVING CO.,
Philadelphia, Pa.

A CONVENTION PRIZE WINNER.

P. A. of A., 1898.



very slight tendency to produce fog, even with very sensitive plates. The image begins to appear in about the same time as with the ordinary pyro-soda developer, but the different parts of the image follow one another somewhat more rapidly than with pyro. The time required for complete development is practically the same as with pyro-soda, but since the color of the reduced silver is somewhat bluer with ortol than with pyro, the apparent opacity of the negative must be somewhat greater with the former than with the latter if the same degree of printing opacity is desired. Nevertheless, any one accustomed to using pyro-soda will probably find himself quite at home with ortol-soda after developing half a dozen negatives with it.

There is no marked difference between the results obtained with ortol-soda and those obtained with ortol-potash, and for general work the former is preferable, owing to its lower tendency to produce frilling. The following formula can be recommended as suitable for all ordinary brands of plates:

ORTOL SOLUTION.

Ortol	7½	parts or	70 grains.
Potassium metabisulphite	15	" or	140 "
Water *to make up to*	1000	" or	20 ounces.

SODA SOLUTION.

Soda crystals	100	parts or	2 ounces.
Sodium sulphite	100	" or	2 "
Potassium bromide	2.3	" or	20 grains.
Water *to make up to*	1000	" or	20 ounces.

For use mix equal volumes of ortol solution and soda solution, and if you desire to make the developer work more slowly, dilute it with water.

With lantern slides and bromide prints, ortol likewise gives excellent results, and may therefore claim to be a universal developer. For use with slides or prints, the developer, mixed according to the above formula, is diluted with its own or twice its own volume of water.

In all cases the activity of the developer is increased by a rise of temperature, and therefore in warm weather it is desirable to use a more dilute developer than in cold weather.

One great advantage of ortol is that it does not stain the fingers, and at the same time, so far as is known, does not exert any poisonous action on a sound skin.

Further, owing to the small extent to which it is altered by exposure to air, the same quantity of developer may be used over and over again for negatives, slides, or prints, as the case may be, and this makes it a very cheap developer, though the initial cost is somewhat higher than that of pyro.

DEERHURST CHURCH AND ODDA'S CHAPEL.

By T. Perkins.

LET me advise photographers from the other side of the Atlantic who visit the birthplace of the bard of Avon, not to overlook a little village easy of access from Stratford, which has the unique distinction of possessing two ecclesiastical buildings dating back to the days before the Conquest. Let them travel from Stratford by "beggarly Brown" junction, famed for its mention in the rhyme attributed to Shakespeare himself, in which he enumerates the villages around Stratford where he is said to have taken part in certain quaint drinking customs of those pre-blue-ribbon days, or by Evesham, where a halt should be made to view and photograph the remains of the Abbey and the two sister churches standing side by side, almost, as it seems, in one common churchyard; thence by Aschurst to Tewkesbury, with its magnificent abbey-church, rich in all styles of architecture, from its massive Norman tower and nave arcading, to its decorative roofs and crown of chapels round its lovely choir—a town in which many half-timbered buildings may be found, and which is inseparably connected in our minds with *John Halifax, Gentleman.* Here let the traveller ask the way to Deerhurst; a pleasant walk through river-side meadows will bring him to the sequestered village, with its Saxon church and still more interesting little chapel built by Odda, the kinsman of Eadward, the founder of our great Minster-Church by the banks of the Thames, wherein lie the mightiest of our English worthies, and which has recently opened its doors to receive, amid the lamentations of the nation—nay, of the world—the body of the greatest English statesman of our century.

The church was once the church of the abbey founded in the eighth century, a monastery once wealthy which was bestowed by the Confessor upon the abbey of St. Denis at Paris, when it became a priory; after that, whenever there was peace between England and France, its revenues went to the French abbey, but when war prevailed they were seized by the English king until, in the days of Henry VI., it was made a "Priory Denizen," the monks electing their own prior without reference to St. Denis. Afterwards, in the twenty-sixth year of Henry VI., the priory was dissolved; it became a cell of Tewkesbury in 1469, and when, in 1539, the abbot of Tewkesbury surrendered his abbey to the king, he was appointed by Henry VIII. bishop of Gloucester, and the king granted the priory lands to the Throgmorton family; the church at Deerhurst became then a simple parish church. Much of the original building has disappeared. The lower part of

the tower is Saxon, the upper part dates from the fourteenth century. On the eastern face of the tower wall a double triangular-headed window looks out from the belfry into the church ; possibly, from this window, many generations of Saxon, Norman, and English bell-ringers looked down on the priest celebrating mass at the altar. The chancel seems to have fallen into decay about the middle of the fifteenth century, and the choir became a ritual chancel. The lay rector, in 1547, sold the stones of the ruined chancel to a neighboring squire. Since the Reformation down to 1846 the altar stood tablewise ; that is, with its longer sides parallel to the north and south walls. The bowl of the old font was for many years used as a wash-tub on a farm, till, in 1843, it was rescued and put to its original use in the church at Langdon, Wor-



Deerhurst Church, Gloucestershire

cestershire ; but about twenty-five years later the original stem was found, and the whole has since been re-erected in Deerhurst Church. Joining the east end of the church is a farm-house dating back to about 1400, which possibly formed part of the domestic buildings of the priory.

About eighty yards to the south of the churchyard stands Odda's Chapel, discovered in 1885. Up to that time it was, so to say, imbedded in some half-timber farm buildings. At that time these buildings were to be converted into cottages, and during the alterations the true nature of the building was discovered.

This discovery was most important, as it cleared up a diffi-

culty. An inscribed stone stating that Odda the Duke had ordered " hanc regiam aulam " to be built and dedicated in honor of the Holy Trinity, and in memory of his brother Elfric. In the year 1056, it had been found buried in the neighborhood of the churchyard, and as no one knew of the existence of the chapel, it was supposed that the stone must have belonged to the vanished chancel of the church, and as the east end of a church was always built first it was assumed that no part of the church could be of earlier date, although, from its character, the tower seemed to be older than this; but doubtless the stone formed part of Odda's Chapel. This supposition is confirmed by the discovery of another stone which seems to have been an altar, but to have been converted into a window-head in the wall of the building formed out of the chapel. The fragment of the inscription is capable, when done into English, of being read as, " This altar was dedi-



Odda's Chapel, Deerhurst

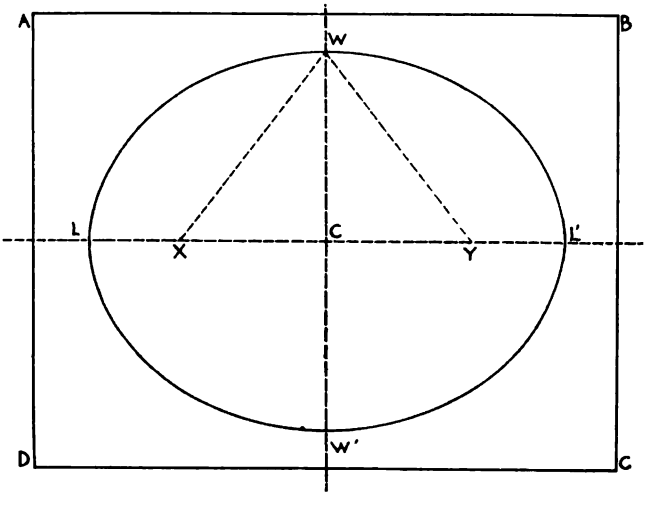
cated in honor of the Holy Trinity." Of Odda himself a few facts are recorded. Like Eadward, he was more suited to the life of an ecclesiastic than to that of a statesman or a warrior, yet he became Duke of Devon, Dorset, and Somerset, and during the banishment of Earl Godwine he had command of the royal fleet; but on the return of the great English earl his rule ceased. His brother Elfric died at Deerhurst in 1053, and to his memory the chapel was built; and shortly after the dedication, on April 12, 1056, Odda himself died (on August 31st of the same year), and like his brother was buried at Pershore. The title " regia auta " may possibly have been applied to the chapel because Odda was of the king's family.

AN OVAL MAT.

By Milton B. Punnett.

WHILE conversing with a skilful amateur on matters photographic he mentioned his inability to make an oval mat. Without doubt there are others in the same dilemma, and the following instructions may find some appreciative readers.

The problem is to draw an oval of a determined length and breadth.



Let A B C D be a sheet of paper out of which an oval with a length L L′ and breadth W W′ is to be cut.

Draw the bisecting lines L L′ and W W′. Upon these lines lay out the desired length and breadth of the oval with the intersection C as the centre. Measure the distance CL and find where a line of equal length will just touch the line LL′ when drawn from W. Mark this point X, and a point at an equal distance from C on the same line mark Y. Lay the paper on a board and drive pins through the points W, X, and Y.

Tie a flexible string close to the paper, around the three pins forming the triangle W X Y. Remove the pin at W and by moving a sharp pencil tightly against the inside of the string, in contact with the paper, it will trace the desired oval. The only catch in the problem is to locate the points X and Y, and their direct distance from W is always equal to one half the length of the oval.

WHAT DO WE SEE?

By Prof. C. H. Cox.

THE discovery and practice of photography has, beyond all doubt, exercised a very great influence on the art of the painter. It may be conceded that it has, on the whole, been beneficial by making bad and false art less endurable, but that it has raised the artistic standard really higher is open to very great question. Of late a strong reflex action has been observable in the aim of the photographer to approach and vie with the work of the artist in painting, in those pictorial qualities which were felt to be wanting in the mechanically produced pictures. The result has been decidedly to raise the artistic value of the photograph, but still without any corresponding effect on the work of the painter.

Very little observation is needed to see that the photographer has abandoned many of the theories of his early creed. In portraiture we miss the wonderful and elaborate backgrounds that used to do duty for "nature," and find, instead, mere suggestions of light and shade, expressing nothing in particular except concentration of effect. Detail also is kept down by various devices, so as to be subordinated to one leading idea, and the portraiture of the painter is taken as the highest photographic arrangement that is to be aimed at. Evidently, from the results, there is something right about this, and the same tendency, though in a less degree, is coming into the finest work of the camera in landscape, although the shibboleth of "sharp all over" is still, with most out-door photographers, the only wisdom, and the only worship of nature that can be tolerated.

In thinking quietly over these two movements of approach from the side of the artist and photographer both, it has gradually grown into a conviction on my part, in which, perhaps, others may share, that there are certain elements in each art which can never in their nature become compatible; and that, however near they may approach, there will always be a gulf between which cannot be crossed.

The question at the head of this article, "What do we see?" is one of those inquiries which everybody takes as a matter of course to be so obvious in its simple answer that it is not open to argument. And yet, like all simple questions which are every-day matters, the reply takes us over so wide an area as to be full of complexity. In the first place, I think it worth while to show that it is something very different from a photograph, and if we can arrive at that conclusion, another may succeed it, that the two images never can be alike. It will be useful to compare and ex-

amine, on the artistic side, the works of painters to whom photography was unknown, because it is only fair to infer that they actually painted what they saw, and not what was mechanically seen for them, as in the present day, by the lens and sensitive-plate. From this influence, which is known in the present time as realism (a misnomer), they happily, I think, may be considered to be free. So that our observation of painters' work must be mostly that of the old masters, and down to the beginning of the present century. Now, in looking for a reply to the question, "What do we see?" we can also include "What did they see?" Firstly, it may be useful to study something of the structure and powers of the eye itself, but there are so many wonders in the human eye, and it is so utterly different from the photographer's lens and camera, that our every-day knowledge will soon find its limit. To begin with one puzzling inquiry: Do any of us, or many of us, see alike? Is the impression on my mind through my eye the same as yours? There is little, if any, way of proving this. We know there are great differences in the sight of individuals, and a difficulty of a serious nature presents itself at the outset. But let us grant this, at least,—we all do see something, and the eye is the instrument which enables an impression to be made on the brain, the mind, the memory—call it what you will. The eye itself is unconscious of what it sees, and it needs some power beyond that of the mind itself—let us call it the will—before perception begins. For instance, how common a thing it is for the thoughts to be far away from what is before us, and we to know nothing whatever of what has been passing before the eye, which all the time has been doing its part. The perceptive faculty, however, had no will to record anything, and for all that was actually seen nothing whatever remains, and the eyes might as well have been closed. This is quite a different process from the work of the sensitive-plate in the camera of the photographer. So that to see anything requires, first, the will to see it; afterwards, the mind takes cognizance of what the eye conveys to it. But from my own observation, and it is also the opinion of scientific anatomists, there is a reflex action from the mind on the eye itself, which influences it to see what is wished to be seen to the exclusion of much that otherwise would have been recorded on the memory.

Apply this to the painter. He has certain aims and tendencies, certain theories, perhaps, founded on tradition and instruction in schools, and he is inclined to look for these things first of all and to ignore the rest. Put, say, four accomplished painters before a landscape and ask them to paint what they see without comparing with each other. You will be astonished at the difference in the results before you, and yet you cannot tell which is most true and right. All are right probably, up to the point on

the artist's mind, and it is that which controls not only his work but what he actually sees. The lens and sensitive-plate record simply what the former throws on the latter, and no arrangement of "stops," or focus, or angle of lens, or speed of plate, can supply the controlling action of the mind on vision, even were the conditions of the camera and the eye the same, which they are not, and probably never will be. The reply of the great landscape-painter, J. M. W. Turner, to one of his critics touches this question rather nearly. "But, Mr. Turner," said the critic, "I never see anything in nature like these pictures of yours." "Very likely," replied Turner; "but don't you wish you could?" Turner saw more, and it left more impression on his mind, probably, than any landscape-painter before or since his time, but it was what he aimed at conveying on his canvas which influenced his eye to select or ignore what did or did not appeal to him, and not what we call photographic facts.



No. 1

There is not any more striking proof of the power of the mind to influence what we see, than the fact that the small image, inverted as it is on the retina, gives an impression of what we know to be life-size and also what we call "right side up." How this takes place we do not know; but it shows how different the result is from that of the photographer's lens and camera. A short comparison of the eye with these may help us to see this further. The lens of the eye is elastic, and is changed or shaped to adapt



Photographed by SCHUMACHER.
Engraved by
ELECTRIC CITY ENGRAVING CO.,
Buffalo, N. Y.

FROM A CONVENTION EXHIBIT.

P. A. of A. 1898.



itself to near or distant vision. The iris or diaphragm adjusts itself in some mysterious way, without the will or knowledge, to the varying conditions of light, expanding or contracting the pupil to every change. What this power is we cannot tell, unless it is a reflex motion set up by the optic nerve itself. The focus of the eye has no wide angle or depth, in fact it is difficult to discover how small it really is. Close one eye and try to focus without motion this print you are reading. For myself, I can-not fix a definite focus on a single letter, and to gain any definition the eye is in constant motion almost without the will being exercised. The result is that a certain amount of what we see gives us an impression of being in clear focus, when actually none of it is so. I think one eighth of a second is supposed to be the time required to make an impression recorded by the optic nerve, and it seems probable that the amount taken in by the eye on the retina during the movement of the eyeball in that time is what gives us the feeling of clearness of vision. But without the action of the eye we should have no clear vision at all. Were the photographic lens to be in motion in this way, we should not have any picture except with confusion on the plate. How, in these varying conditions, is it possible to reconcile a photograph "sharp all over," with what we actually see, which is much nearer the effect of a vignette than anything else? In fact, the pleasant sensation which a vignette usually gives, and the aim of the photographer to soften off the parts not



No. 2

of first importance, are really attempts to get nearer to the actual human vision than what the camera has given on the plate.

The impressionist school of painters recognize as a first principle, "that you cannot see everything at once," and there is always a charm in their work, although most consider it eccentric. They appear, however, to undervalue the constant motion of the eye, which leads the mind to see and perceive more than appears to be possible, judging theoretically. Hence, a picture should be a sort of compromise between actual vision and mental impression, which supplements the principal object with a certain amount of detail outside of it, and which the imagination actually supplies for itself.

The subject might be pursued much further, but space forbids. The only thing for photographers is to study the work of painters before photography was invented, and to see what they saw. The ordinary idea is that Rembrandt is *the* model portrait painter to follow in light and shade.

But there are others as fine, or finer, for them to study—Velasquez (see the heads of Gervaitius and Æsop), Rubens, Frank Hals, Vandyke, Titian, are superb examples, with a host of others. For female portraiture, Reynolds, Opie, Romney, and Gainsborough of the English school, and even Lawrence, are valuable; while France, in Greuze and Madame Vigée Lebrun has beautiful examples to study. Endless other artists might be cited for portraiture. In landscape, Constable, Stanfield, and Turner, in England, are worthy of the highest consideration as painters before photography was invented; and for architecture, let any man study the work of David Roberts, R. A., as surpassing any photograph in feeling. The old English school in all respects is worthy of reverence, as pure and beautiful art, painted as the painters saw it, and were it not for the inordinate length this paper has, and might run to, I might cite names which will live while art exists as models of style, subject, and treatment for the photographer to build his art upon, and to make it live also as a "thing of beauty," which is a "joy for ever."

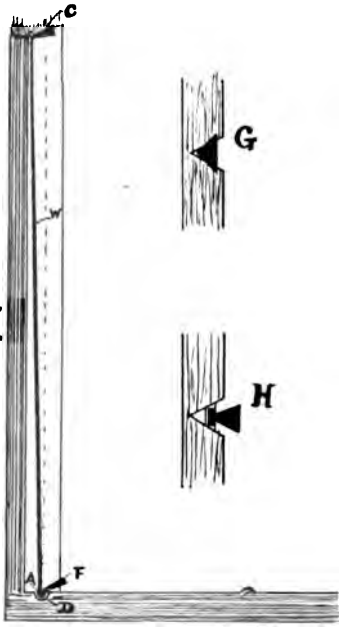
I insert two illustrations from nature. No. 1 is as nearly as possible what I actually see when my eye is fixed on the centre post, near the top. Everything is vague and undefined except the knot indicated. Even the lower part of the post is by no means distinct.

No. 2 is what I think I see, or the mental impression given by the motion of the eye, and which looks much more in focus than is actually possible. The mind supplements everything to a very large extent. It may be observed, however, that you cannot see all the picture in focus, and that painting is a compromise between actual vision and a calculation of how much of the picture itself can be seen at once.

IMPROVED TROUGH FOR ALUM OR HYPO.

By H. Hands.

I SUPPOSE every photographer has, at some time or other, had the misfortune to drop two negatives into one groove when using the ordinary grooved trough in the dim light of the dark room. It is not an easy matter to avoid doing it unless one puts one's hand into the liquid and feels about for the empty groove, and when there are several plates to develop, it is as well to keep one's fingers out of the hypo, both lest the developer be contaminated and negatives spoiled. In dropping two plates in one groove, how often has a negative been spoiled by having part of its film scraped off —and it is always an important part of the negative!



I have devised the following improvement, which, while it obviates the aforenamed risk, also does away with necessity of dipping the fingers into the liquid.

If some maker of troughs will put on the market troughs made after such a pattern as this, well and good. If not, my advice is, make one yourself with wood. Coated with a mixture of $\frac{2}{3}$ pitch and $\frac{1}{3}$ resin, it will be as good as anything you can buy.

Referring to the figures, K represents a vertical section of one groove of the trough. In every groove is my piece of apparatus represented by the letters C, W, F. It is merely a length of thin wire with a piece of tin soldered at the top, a plan of which is shown in figure G. At the bottom end of wire is fastened a thicker piece of wire at right angles which we will call the "axis," marked A, and which works in the depression D at the bottom of the groove. Also secured to the axis is F, which is the "foot-piece." Plan of axis with foot-piece is shown in figure H. We will call C the "cover-piece." When no plate is in the groove, the cover-piece lies in a slanting position, as shown, and allows the plate to *just* pass it. Note that the depth from front to back of each groove must be sufficient to allow of the cover-piece lying far enough back to clear the plate, and also the distance between

the cover-pieces in opposite (or pairs of) grooves should be such as to just allow the plate to pass between them, but not so much as to allow the plate to slip sideways out of the groove altogether. When the plate is lowered into the groove, as soon as it touches the foot-piece the cover-piece tilts forward and covers up that particular groove, and no other plate can be put in. The action is automatic, and even when the negative is dropped in askew, or, in other words, in grooves that are not opposite, so long as the negative reaches the foot-pieces the *pair* of grooves occupied by that negative will be closed and a second one cannot go in. This useful article can be made by anyone, and should be painted over with the mixture of pitch and resin. Readers will agree with me when I say that much less useful articles are regularly patented.

CLOUD NEGATIVES—THEIR PRODUCTION AND USE.

By Fred H. Davies.

ALTHOUGH, in these photographically advanced days, a landscape photograph without a sky is looked upon as an unfinished production, it is surprising that so little system is shown in arranging the combination.

How many amateurs are content to purchase one or two cloud negatives from their dealer, and how many who do make their own do so without any definite idea as to their ultimate use.

Cloud negatives should be selected with the utmost care, for in many cases their introduction into the landscape either mars or makes the picture. Due allowance should always be made for the effect they will have upon the existing composition, and if one is selected that does not comport with the landscape, it should immediately be rejected.

It is surprising how useful clouds are in assisting or recovering the balance of a landscape, and many a negative that, by itself, could not be used for want of balance, may, with the assistance of suitable clouds, be made to yield a pleasing picture.

Cloud negatives should be secured whenever opportunity offers. Some workers advocate the use of two stops during exposure, but the writer has found that one medium-sized stop will give perfectly satisfactory results. The exposure should be ample, but the negative should not be dense, and must be kept as free from stains as possible. It is far better to expose from rising ground than to tilt the camera to any great extent. The time of day, date, condition of weather, and solar position should be carefully noted. The careful worker will then make a print from each

negative, and paste in an album with these particulars underneath. When it is desired to print in a cloud negative, a reference to this album will ensure that clouds and landscape harmonize one with the other, and that conditions of lighting are the same.

The developing and printing of cloud negatives have been so often described in the various text-books, that it is unnecessary for me to go over a process so familiar to all workers. I can, however, strongly advocate the use of sand for combination printing. A tray, with glass bottom, partially filled with fine, black sand, is placed over the printing-frame. By judiciously arranging the sand with the tip of finger, any portion of the negative may be printed or stopped out, without risk of hard lines.

A FEW HINTS.

By E. S. Kibbe.

MAKE a number of cabinet negatives of some child and print them in the form of a frieze, using a very light background for negatives and printing with combination printing-frame. Copy down the large picture and make a negative to fit a mount the same length as cabinet, but panel-shape. This will take in three positions. After the parties have ordered all they wish of the large single pictures, show a print from the small negative, charging the same as for your cabinet work, and you will seldom fail to get an order for at least one dozen, and perhaps more. Then make and gild a mat one inch wide for the small picture and a one-quarter inch gold frame with easel back, and you are reasonably sure of selling one of those.



To make a mat for display-frame, take a sheet of ordinary pulp matting board, which comes in sheets 30 x 40 inches. Cut out openings of different shapes and sizes to harmonize well, and attach pictures to the back of this with a little liquid glue. The arrangement, of course, is limited only by individual taste.

I recently tried a new scheme which seems to "take" here. I make a picture 1½ x 2 inches (bust), mount it on a nice Mantello

card (No. 110), and charge 75 cents per dozen for them. To make the negative, I cut a 5 x 7 plate each way in the width, which makes four negatives, each $2\frac{1}{2}$ x $3\frac{1}{2}$ inches. To hold these small plates I made a holder out of a piece of picture backing and strip of flat brass for spring, to fit the inside kit of my camera, of which the accompanying cut gives a very good idea.

LAST YEAR'S ANNUAL: A NOTE.

By Digby Cotes-Preedy.

LAST year I was unable to send any views to illustrate my short article on Emmanuel College, Cambridge. Through the kindness of your editor I am able to show four small views of Harvard's College. Visitors to the old country must take better ones for themselves, for mine hardly do



Front of Emmanuel College



Front Court of Emmanuel College



The Hall of Emmanuel College



In the Grounds of Emmanuel College

justice to Emmanuel, though they may give some idea to perfect strangers. The photograph of the Hall was taken previous to a May-week concert. One of the four comprises the hostel, portion of the old pond, and part of the tennis ground. I also take the opportunity to send two photos taken during the National Eisteddfod, held at Llandudno in 1896. The costumes of the Welsh bards are simple but quaint. In one of the pictures can be seen the Arch-Druid addressing the assembly.



Meeting of the Bards in the Happy Valley, Llandudno



The Arch-Druid Speaking

LATITUDE OF PLATE.

By Alfred Watkins.

WIDE claims are often made for the virtues of such and such developers in dealing with long and short exposures, and the credit is given to the developer when in most cases it really appertains to the plate.

It is well worth while to glance for a few minutes at what constitutes over, under, and correct exposure in a plate without considering variation of development. A plate can be regarded

as coated with a substantial layer of jelly in which are scattered sensitive particles of silver bromide.

We all know that the varying amounts of light reflected from different parts of the subject, have to affect a varying number of these particles in different parts of the plate so as to form what we call the gradations of the negative.

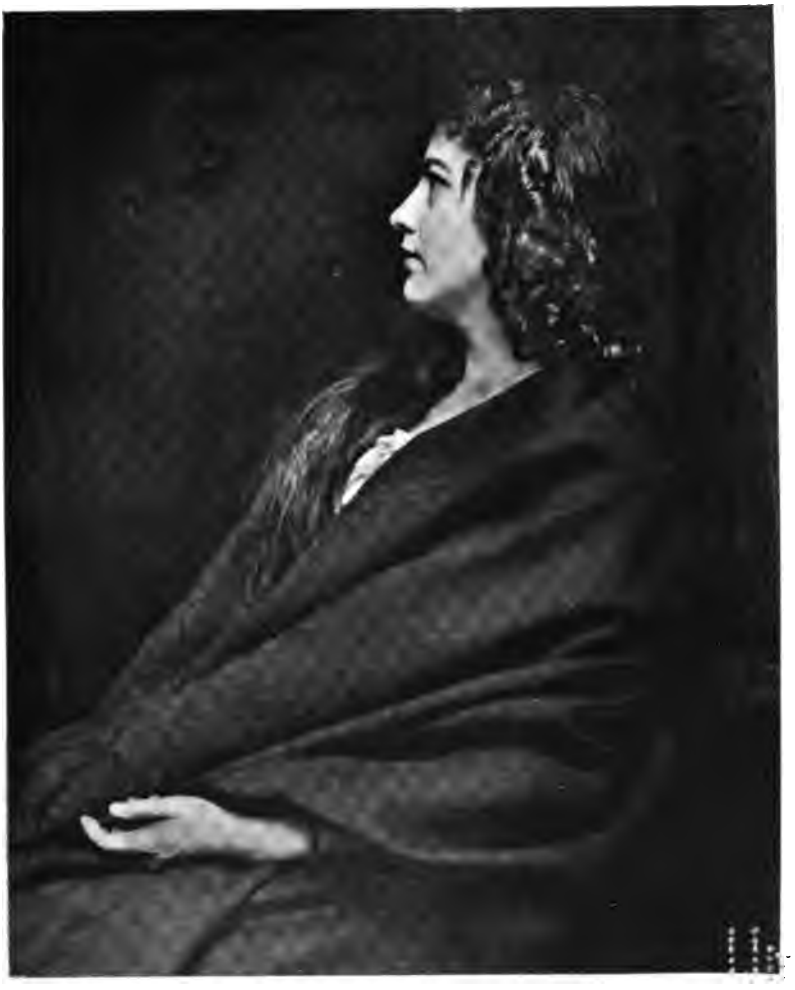
Now it is possible to expose a plate to so small an amount of light (or what is the same thing to a light for so short a time) that no particles at all are affected, and when developed and fixed the part acted upon remains clear glass. In other words, there is a *minimum* effective light-action.

Now for the other extreme. If we try exposing the plate to continually increasing amounts of light, more and more silver particles are affected, until we at last come to an exposure in which *all* the silver particles in the thickness of the film are affected. Any longer exposure than this has no further action, and this may be regarded as the *maximum* effective light-action.

A correct exposure is one which is long enough for the light reflected from the shadow detail to have at least the *minimum* effective light-action, but which is not so long that the highest light comes much over the *maximum* effective light action.

If too short, several of the shadow tones which ought to be represented by varying gradations are represented as clear glass. If too long, several of the lighter tones at the other end of the scale, which ought to be represented by varying gradations also, are represented by equal densities in the negative, and we have the gray flatness of over-exposure.

Of course this maximum and minimum depends upon the sensitiveness of the plate. With a poor quality plate (as a certain class of rapid plates) there is not a wide range between them but with a good thickly coated plate there is a far wider range, much wider than the range between the maximum and minimum amounts of light reflected in an ordinary landscape. It follows, therefore, that with a good plate there can be a considerable variation in exposure (time the lens is uncapped) and yet the shadow detail will not come below the minimum, or the highlights above the maximum. This range of exposure is about 1 to 10 (and sometimes more). That is, if with one-second exposure the light from the faint shadow detail is just sufficient for the minimum effective action, as much as 10 seconds can be given and exactly the same print may be secured, provided that with the short exposure the negative is kept thin, and with the long exposure a dense negative is secured. Photographers almost always over-develop their under-exposures, and under-develop their over-exposures. To stop development at the right time no difficulty will be found if the method I gave in last year's ANNUAL be followed.



Photographed by HOMEIER & CLARK.
Engraved by
TEACHENOR-BARTBERGER ENGRAVING CO.,
Kansas City, Mo.

PENSONA.

A CONVENTION PRIZE WINNER.
P. A. of A., 1898.



POTASSIUM PLATINITE.

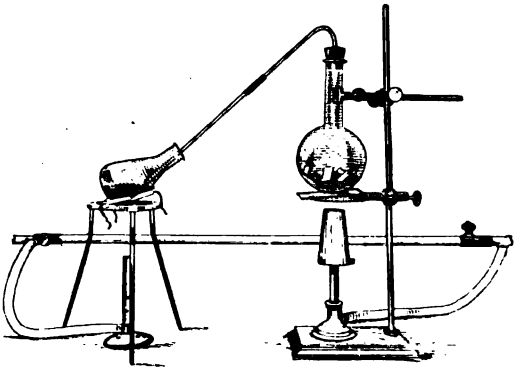
By H. F. Raess.

POTASSIUM platinite, or potassium platinous chloride, K_2PtCl_4.

There are several methods of preparing this compound. All of them are more or less unsatisfactory, from the fact that when platinic compounds are reduced their reduction appears to be only partial. The method which I have found the most successful is as follows:

A solution of platinic chloride ($PtCl_4$) of any convenient strength is placed in an erlenmeyer flask (an ordinary flask may be used, but the former is better), and to it is added a solution of potassium chloride (KCl), preferably 10 per cent. strength, until all of the platinum has precipitated as potassium platinic chloride (K_2PtCl_6).

A slight excess of potassium chloride does not matter, or, if the strength of the platinic chloride is known, the theoretical amount of potassium chloride is calculated. The liquid in which the precipitate is held should not be thrown away, as it contains a small amount of potassium platinic chloride in solution. The liquid is then made up to about twenty times the bulk of the precipitate with distilled water, and the flask then placed at such an angle (if an erlenmeyer flask is used) that the precipitate collects in the corner of the bottom; it is then cautiously heated to near boiling point for about half an hour, sulphur dioxide (SO_2) is then conducted through it in a small stream, at such a rate as to slightly agitate the precipitate, and the heat is then carefully increased until the solution boils very slightly. This is continued until the precipitate has dissolved and the liquid has assumed a deep ruby-red color, due to the formation of the platinous compound,



$$K_2PtCl_6 + SO_2 + 2H_2O = K_2PtCl_4 + H_2SO_4 + 2HCl.$$

The least shade of yellow color indicates that the reduction has not been complete, and the gas has to be passed through longer.

As soon as the reduction is complete, the passage of the gas should be stopped and the heat continued until no odor of sulphur dioxide is perceptible. If a brown or black precipitate (platinum black, metallic platinum) is noticed, it indicates that the reduction has been carried too far.

$$2K_2PtCl_4 + 2SO_2 + 4H_2O = 4KCl + 2HSO_4 + Pt_2 + 4HCl.$$

The passage of the gas should now be stopped, and the solution heated to expel the excess of gas; the liquid should then be allowed to stand twenty-four hours, protected from light, after which the platinum is filtered off.

If the operation is carefully watched and the passage of the gas stopped as soon as all of the precipitate has dissolved and the liquid has assumed the deep ruby-red color, there is no danger of carrying the reduction too far.

As the reaction indicates, hydrogen sulphate is formed, but it has been found that the amount is small, and is not objectionable, especially if it is used for toning. Should it be desirable to have the platinite free from the acid, the solution may be concentrated by evaporation until, on cooling, it deposits crystals of potassium platinite, which may be dried over hydrogen sulphate.

PERMANENCE.

By H. M. Beeles.

SINCE prepared printing-out papers have come to be so universally used, the nightmare, if I may so call it, of photographers has been the fading or yellowing of prints. Approximately, the carbon print, or a print made on platinum paper, has a gratifying stability, but these will not for many years become the pictures for the masses, because of the extra cost of production, and because, when both are new, the difference is not sufficiently apparent to the patron to induce him to pay the difference in cost.

I am frank to say that I believe the results, as a rule, that were obtained on albumen paper were more permanent than the majority of printers obtain to-day on collodion or gelatine, and also as frank to assert that such ought not to be the case.

Where, then, is the trouble? My experience teaches me that the most of it lies in the fact that the formulas have universally understated the time that is necessary to fix these prints, and printers have followed the formulas too closely. A collodion print will fix thoroughly in much less time than a gelatine positive, but I would not advise any one to fix in ten minutes if permanent pictures are desired. Gelatine paper, if the gelatine be at all of a

hard variety, will require a liberal fixing in strong hypo. If there be some vignetted prints in the lot under treatment, it is easier for the eye to distinguish when fixation is complete. As gelatine is very tenacious in its hold on chemicals, it is well to be in no great hurry to remove prints when they appear all right to the eye. In other words, when a vignette has been in the hypo a few minutes (*i. e.*, a gelatine print) there will appear in the edge of the vignetting a halo of a brownish tint. Fixing must continue until this tint entirely disappears, and, as I said above, for a short time, say five minutes, longer.

Then the washing for gelatine must be very thorough; an hour and a half will be none too long, with frequent handling from water to water, or in an automatic washer.

CHRISTMAS AND OTHER CARDS.

By H. Crisp.

ONE of the many pleasing uses that photography may be put to by the amateur, is in the production of Christmas and other cards containing family portraits, local views, etc. These, apart from the pleasure of their production, are always more welcomed by the recipients than the ordinary purchased variety, and are valued accordingly. It is necessary, if the photographer is unable to use the brush, that the services of some one who can, be enlisted, and a suitable design be drawn on a piece of cardboard. A negative is then made from the design, of the size desired; the opening for portrait, as in the case of the first illustration herewith, being



stopped out on the negative by means of a small brush and some India ink. A print from this negative is then made, and the portrait decided on printed (in the blank space left in the print) from the portrait negative by suitable masking. In the second illustration the prints are mounted on the design and the whole reduced together, only the one printing being then required. Floral designs may also be arranged, or dried grasses, flowers, etc., used.



PARAPHERNALIA FOR PERIPATETIC PHOTOGRAPHERS.

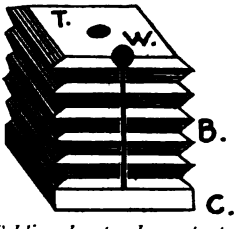
By Reginald A. R. Bennett, M.A. (Oxon.).

THOSE devotees of the noble art of photography who have occasion frequently to travel about the country with their impedimenta, must necessarily find it a matter of great importance that their apparatus should be capable of being packed into the smallest possible space. With respect to the camera and its belongings, so much ingenuity has been expended on the matter that I could not undertake to evolve anything new, but I think it is always desirable, when possible, to take not only the means whereby the plates may be exposed, but also, if the length of stay will admit of this, the means of developing them too. It is always desirable to do this if practicable, as, if a number are exposed while away, it makes such a lot of work to develop them on returning home, and one can also judge of the exposures much better if development is carried out from

day to day, so that future exposures may be estimated by those made as we go along.

There is no reason why the requisite developers, etc., should not be taken by the itinerant photographer in a very small box, if they are made of such a shape that they will occupy but small space. I have recently been studying how best this may be done, and the result of my endeavors I lay before my readers in this article. Probably other ideas will occur to them in addition to my own, but I shall, at any rate, have shown that all necessary chemicals and apparatus can be contained in a very small compass.

One very important piece of apparatus is the *ruby lamp*. This can be made of a form which will pack up into a most exceedingly small space by constructing the body of it similarly to the bellows body of a camera, but, of course, of ruby fabric, or, preferably, ruby lined with yellow. The size of the bellows can be 9 inches square, and about the same height. The sides are kept distended by means of wires at the sides, which are nearly, but not quite, as long as the lamp is to be tall, so that when the lamp is not in use they will fold up flat with it. The bottom of the bellows is secured to a framework of tin plate or wire which lies flat on the table, but it is preferable to place it in a box the right size, and very shallow, as this tends to keep the light still more from getting out. At the top is a square of tin-plate, with a ventilator in its centre. This lamp, properly made, will fold up to about ¾ inch in depth, and go at the bottom of the travelling box. It is lighted by means of a night-lamp, or small piece of candle in a glass night-light holder. This being low down, the ruby fabric is in no danger. My first picture shows the lamp, which will give a splendid and safe light.

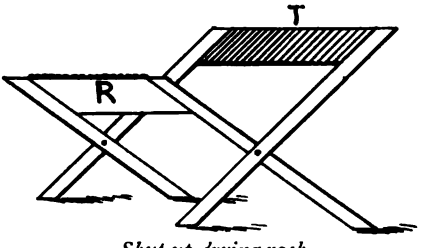


Folding lamp when set up

T. Tin square at top of bellows, with ventilator for candle.
W. Wire holding lamp erect.
B. Bellows of ruby medium.
C. Box to contain lamp.

The ordinary *dishes*, made of porcelain, are of a most inconvenient shape for packing, and very liable to get smashed on the way. Having had this misfortune occur to me "many a time and oft," I have now abandoned the use of them when travelling about, and instead thereof I use four tin dishes 2 inches deep and of such a size that each will fit into the next larger, the smallest measuring the size required for the plates used. For instance, for half-plates I have one about 7 by 5 inches, inside measurement. They are enamelled, weigh little, and will never smash! Moreover, inside the smallest you can pack a large number of bottles containing developers, etc., and thus again economize space.

With respect to developers, you want one that does not require many different parts to adjust it. I usually employ that given with the "Paget Prize" plates, which contains ½ ounce of pyro to 5 ounces of water. Of this, I use 1 drachm to 2 ounces of developer, so that the 5 ounces lasts me for a long time. There are two solutions only required, the other being one of sodium hydrate. You can take alum with you if you use it, but I recommend you not to do so. "Hypo" one can now purchase in any respectable-sized town, so that unless it is a country visit it is hardly necessary to take that. You will want some bromide solution for over-exposed plates, and some ammonia for under-exposed ones which require some forcing.



Shut up drying rack
The side R shuts up underneath the side T.

Besides the bottles containing these, you will want a draining-rack.[1] The best form of this is one of which the one side folds up under the other, being lower than it. My second picture shows what I mean. The result of this is to make a perfectly flat framework, the depth being merely the thickness of the wood.

The easiest, the simplest process to print when away from home, is the platinotype process. This requires nothing but a small bottle of developing solution in a concentrated form (as given with the paper), and a small bottle of strong hydrochloric acid. Besides being the simplest process, it is also a great advantage to be able to wash the prints only for a very short time, especially in country places. Any process involving the use of silver will compel you to wash for hours, if the prints are to be permanent; ten minutes only is ample for the platinotypes.

To print these it will be necessary to take a printing-frame. I do not see how this can be contracted in any way, but the usual sort occupy but a very small space. Of course the flatter the kind you use the better.

Taking it all together, you can get sufficient apparatus and chemicals to make and develop and print two or three dozen negatives, into a box measuring about ten inches square, and weighing about nine or ten pounds. This is not a great addition to your luggage, and can be carried in the hand, if need be, without any great exertion. Of course to this you must add the weight of the number of plates you employ, but these you would have in any case, so that I have only counted the extras.

The bottles must, of course, be carefully packed in your box.

[1] This form of rack seems to be identical with that manufactured by our publishers, under the name of Anthony's Folding Negative Rack.—EDITOR.

I find it best to fasten a piece of linen over the stoppers, tying it round the necks with thin string. This prevents the stoppers from being loosened on the journey, and a mixture of developers resulting. If the bottles are wrapped round with cloths, etc.,—which can be used in the dark-room during the holiday,—there ought to be no fear of breakage. In all the years during which I have travelled with my developers in this way, I do not remember a single case of breakage, as far as the bottles were concerned.

I think I have done my best to make good the statement that all required apparatus for the production of both negatives and prints can be easily taken on a journey, if properly packed. I have often wondered why so many peripatetic photographers leave all their developing work to be done when they return home, and if I have said enough to make some who would like to see the result of their exposures while away from home less afraid of the risks which are involved in the transport of their chemicals and apparatus, I shall not have written my article altogether in vain.

ILLUSTRATIVE PHOTOGRAPHY AND A NEW PROCESS.

By Ernest Beringer.

NOVELTY or strangeness of a scene, if it carries the imagination to a higher or to a lower plane, can only be appreciated by individuals, and by them in unequal degrees. Description of such, to be effective, must be the work of a word painter, or it will be untrue—that is, it will fall flat, or be over-developed in contrast. This inability on the part of even good writers to adequately express in words the impress of nature on the mind, makes photography a most valuable illustrative aid.



Mexican Landscape

The two photographs represent scenes in the Mexican sierras. Without

words they illustrate wild, mountainous regions—one, the character of the landscape, the other, a petayah—a vast, leafless cactus numerous on the sides of the Sierra Madres.

A NOVEL PHOTOGRAPHIC PROCESS.

If we take an ordinary blue print (ferricyanide) and place it in a solution of silver nitrate, in a short time the print will entirely bleach. Let the print be now washed thoroughly, to free the paper from all unaltered silver nitrate (preferably in a darkened room); then place in a solution of copper chloride. An immediate and interesting change takes place, the bleached picture coming up in a coppery-brown tone, which strengthens on exposure to light.



Petlayah, Sierra Madres

A FEW THOUGHTS ON PHOTOGRAPHING IN NATURAL COLORS.

By Jabez Boothroyd.

PHOTOGRAPHING in natural colors still engages the attention of the photographic, as well as the general public mind, and reports have been published from time to time stating that this great and most absorbing problem had been solved, but thus far I think I may confidently say that all these reports have been but mere illusions. I have no



Photographed by J. E. MOCK.
Engraved by
NATIONAL PHOTO-ENGRAVING CO.,
New York, N. Y.

A CONVENTION PRIZE WINNER.

FROM GRAND PORTRAIT CLASS,
P. A. of A., 1898.

hesitation in stating that, in my opinion, all the reports of what has been said and written on this most interesting subject, as well as the results published of the different experiments made in the endeavor to photograph in natural colors, thus far tend to strengthen my belief that this is a problem that the human mind is unable to solve, for I cannot perceive that we are making any progress toward the attainment of this most desirable result.

It has often been said that the human mind can construct mechanism to make every article that man's necessities require, or which his fancy may suggest. There are two articles, and very important ones, too, that the human mind cannot construct mechanism to produce so as to become a commercial success; though fortunes have been spent in trying to do so, every attempt thus far has been a failure. The two processes referred to are, the cutting of velvet-pile and the cutting of steel in making files. The human hand alone thus far has been able to do this; material mechanism cannot be endowed with the sensitiveness of the human hand, and never will be, therefore these two articles will never be produced by machinery so as to become a commercial success.

The sensitive film upon which is to be photographed the detailed outline of natural objects is also devoid of that principle of life which alone can give the sensitiveness necessary to render the film capable of receiving the impression of natural objects in all their natural colors, and then represent them to our minds in all their natural loveliness just as that optical instrument, the eye, presents them.

When I first read the report of the Radiotint Process, I thought, "Well, we are coming to the solution of the problem of photographing in natural colors at last"; but after carefully considering the matter, I came to the conclusion that the process was nothing more than another method of coloring prints, and that the power of selective absorption, which the author of the process claimed, had no existence in fact. I myself used a similar process for coloring photo prints twelve years ago, but I never considered that there was any power of selective absorption about it, although the colors did seem to absorb into the prints in an apparently quite magical manner. My photos were enlargements from quarter-plate negatives upon bromide paper.

If the problem of photographing in natural colors is ever to be solved, we shall have to start (as I have often stated) from entirely different premises. The atomic theory will have to be revised and built upon a more true and firm foundation. At present the theorists seem to reason from the effects rather than from the cause of those effects, especially in photography.

A rising scientist, a short time ago, said to a friend of mine that the atomic theory would have to be thoroughly revised and built upon the premises that I had been contending for, for so many years. The reasoning from effects will have to be aban-

doned, and the great cause of all effects be made the starting-point or foundation of all scientific investigation. All natural phenomena are the result of the operation of infinite power upon universal matter. Infinite power is invisible,—we cannot see it with our bodily eyes ; we can see the effects that that infinite power produces upon visible universal matter with our bodily eyes, in fact can realize it with all our material bodily senses. Seeing, hearing, tasting, smelling, and feeling are cognizant of all these effects. But these senses cannot perceive or reflect upon the invisible cause of these effects ; it is the invisible mind alone that can do this.

These material bodily senses are animal senses, which all animals possess in the degree necessary to their bodily wants. It is only man that possesses an invisible mind that can perceive and reflect upon the invisible cause of all natural phenomena. The material body is not the man, it is but mechanism by which the man makes his invisible presence known. Man is as invisible to the animal senses as is the great cause of all natural phenomena, for man cannot be seen with the bodily eye.

Such statements as these I have just written I have no doubt will be ridiculed by the great majority, but they are facts nevertheless. What bodily eye ever saw a thought? You may read the best book that ever was written, and one full of great thoughts, but the bodily eye will never see them ; the bodily eye will see the writing, but it is the invisible mind alone that can perceive the thoughts which the book contains. It will, therefore, be necessary to grasp these first great principles before the atomic theory can be based upon a true foundation.

The reflecting mind, whilst contemplating the things around itself, cannot but be struck with wonder and surprise at their variety of form, the perfection of their structure, and the wonderful adaptability to the purpose for which they were made, and also the changes that are constantly taking place among these things that he is thus contemplating, whether they be vegetable, animal, or mineral. Matter, whether organic or inorganic, is inert and, therefore, cannot produce any effect, so that all the changes or effects which the eye can see and the mind perceive are constantly taking place, cannot possibly be produced by inert matter, neither can the effects produce themselves, as every effect must have a cause.

Every effect must have a cause, and the cause of all effects is infinite power. Power being infinite, and the finite mind of man being unable to grasp the infinite, infinite power is manifested through what are called the natural forces—light, heat, electricity, attraction, etc. The finite mind is able to grasp or understand the operation of these natural forces, and is also capable of comprehending the laws that govern the natural forces in producing upon universal matter the varied natural phenomena which the

eye can see and the mind perceive are constantly being produced. The mind of man is thus enabled to direct the natural forces to minister to his varied fancies, needs, and necessities.

Light is the natural force which the photographer has most particularly to deal with, and it is the operation of this natural force, light, upon inert matter, and the changes or effects that this force produces thereon, that he will have to make himself thoroughly acquainted with, if he wishes to make the best use of that important force.

Photography, or the delineation of natural objects in all their minute details by means of the force, light (and which really is light-writing), is now an established fact. It is, therefore, not to be wondered at if the human mind, elated by the success which it has already attained, should become ambitious of being able to detail the natural objects in all the colors with which they are adorned, by means of photography—that is, by directing the force, light, to produce in natural colors what that force has already done in monochrome, and thus be able to transmit to posterity in all their natural loveliness those objects by which we are constantly surrounded and which we so much admire.

Scientific theorists appear to consider motion, or vibration, of the universal ether as the cause of color, and they assign for each color a certain length of wave of that ethereal vibration. Vibration is an effect, and, according to their own reasoning, an effect cannot be a cause. Motion or vibration presupposes something to be moved or vibrated, and that something will necessitate a force or power to move or vibrate it, and the moving or vibrating of that something cannot possibly be the force or power that causes that something to move or vibrate: such reasoning, in my opinion, is most ridiculous.

In my paper in the INTERNATIONAL ANNUAL of 1895, on the difficulties to be overcome in photographing in natural colors, I concluded by stating that the different forms of atoms necessary to reflect or refract light in the different angles required to present to our minds the different tints which natural objects presented would, somehow or other, have to be infused into the sensitive film upon which the natural objects had to be photographed, before we could expect to be able to photograph in natural colors. The premises, that matter is inert and cannot, therefore, produce any effect, will have to be the foundation upon which to build, if this great problem is ever to be solved.

The editor of a local paper, in replying to an article I wrote some years ago, said that by stating that matter was inert I ran my head against all theories of matter. *He then stated that every particle of matter attracted every other particle of matter*, and that the measure of the force was called the attraction of gravitation.

I replied, that if by stating that matter was inert I ran my

head against all theories of matter, so much the worse for the theories, as my premises would protect me from being injured by such a collision, and that those theories only would suffer that were not built upon that firm foundation upon which I took my stand, for I still contended that matter was inert, and that one particle of matter did not attract another. It was an invisible power that forced them together, and the measure of the force was not the attraction of gravitation; the attraction of gravitation was the force, and the measure of the force was the index of that force.

Color is neither matter nor power; it is only an effect produced upon matter by the force, light. All the colors of the rainbow are the effect of the reflection of light from the globular drops of rain; the colors of the spectrum are the effect of the refraction of light passing through a prism of glass, and the angle of reflection or refraction determines each particular color; so that if we wish to produce, by means of photography; the different colors which natural objects present to our minds, the different forms of atoms which are necessary in natural objects to so reflect or refract light will, somehow or other, have to be infused into the sensitive film. How is this to be done?

Can we direct the force, light, to so change the forms of the atoms of silver and arrange them in the order in which the atoms that are in the objects to be photographed are arranged, so as to reflect or refract light in the angles necessary to present to our minds the varied colors and tints with which to reproduce? or shall we infuse the different forms of atoms into the sensitive film and direct the force, light, to arrange them in the order necessary? If it is necessary in natural objects to be so constituted, I cannot perceive how we are to succeed in photographing without a like condition.

Sensitiveness to color, as is so often expressed, is, in my opinion, most misleading. Color is only an effect, and, therefore, cannot be a cause by which other effects are produced, as that would destroy the premises upon which all natural phenomena are based—as matter is inert, and the effect cannot be a cause.

Light in being reflected or refracted by any colored media may be influenced thereby. And no doubt the different forms and conditions of matter are necessary to enable the finite mind to so use the natural forces according to fixed laws and turn them to a good account and direct them to minister to man's varied fancies, needs, and necessities. The force, light, may thus be made to serve many useful purposes, especially in photography.

Different colored media may, and no doubt do, serve as instruments to enable the human mind to make a greater and wider use of the natural force, light.

MUTUAL HELP BY RECORDING EXPERIMENTS ACCURATELY.

Rev. F. C. LAMBERT.

AS one grows older, and learns how little one knows, and how much there is yet to learn, something like regret is felt that so much valuable time is wasted and good work lost just for the want of a little system, a little thought, a little care. We, who compose the great brotherhood of camera workers, are frequently experiencing troubles, difficulties, and failures. Naturally enough we set to work to find out the cause of the failure, and the secret of success; and sometimes we do find what we seek for. But in how many cases do we take enough trouble to let others share in our labors. I, for one, do *not* think that selfishness, but that thoughtlessness, is here the real cause. Our own trouble and worry is very real to us at the time, or until we find out and remove the cause, but so soon as that is done, we just forget all about it. And yet is it not very likely indeed that there is some "other fellow" in the next street, or a thousand miles away, who quite recently made just the same stupid blunder we did last week? We had the good luck to find out where we went wrong, and saw how stupid or careless we had been, but he, poor chap, has tried everything *except* just the right thing, and so he is still in trouble. How easy for us to say "just try so and so and your troubles will skip."

By way of a practical suggestion, I would like to ask every reader of this note to invest in a small note-book, and therein to enter any little failure, or mistake, or difficulty, and so soon as he has found out the cause and cure, just to make a point of sending a brief, yet detailed account, of what he did wrong, and how he put matters right, to the nearest photographic journal. Let it be done *at once*, while all the details are fresh in mind, and let the details be given with as much accuracy as possible. This brings me to a bit of advice I should like to offer to my brother workers, viz.: the need of accuracy in making experiments. How often has it happened to most of us that we have been trying a few random thoughts, a little more this, or less that, and been somewhat surprised to get a very good but unexpected result. On trying to repeat it next day, for the very life of us we could not be sure whether it was two parts A, three of B, and five of C. And so we have to try a dozen experiments, wasting time and material, just because we were too careless to jot down *at the moment* what we were doing. I would therefore say, keep in your dark-room or workroom, a note-book and pencil attached by a piece of string, and jot down exact quantities as you go along; also the effects, be

they success or failure. You will find this saves you not only time and temper, but money and material. Experience has proved to me the value of keeping these various note-books always at hand. And while I regret that I did not start them long, long ago, I am not without the hope that some of my note-book jottings may have helped to lighten the footsteps of brother travellers.

FINISHING PLATINOTYPE PRINTS AND OTHER NOTES.

By W. Cooper.

THE manner in which a print is finished adds a great deal to its beauty, and the following is a very simple and at the same time effective way, though applicable more particularly to platinum prints, of making the finished print look like a plate engraving.

The way I proceed is this. I take, say a quarter-plate negative, stick a little slide binding round it to get a sharp line and a safe edge. I then take a half-plate printing-frame and a piece of clean glass in it and lay in a mask, with opening slightly smaller than the quarter-plate, the opening a little larger than the safe edge, and on this lay the quarter-plate and place a piece of half-plate paper on it. The masking is to keep the edges and margins clear and clean. Print and develop in the usual way, and you will have a print with a wide white margin. Take the print out of the last washing water, blot it and lay it face upwards on a piece of thick cloth. I use a piece of melton cloth and over the centre place a square of cardboard with round or square corners as preferred; a quarter plate mount answers well if not glazed, and on this place a flat piece of card, put the whole in a letter-press, screw well down and leave for some time; then take out and I think you will be pleased with the effect. If your negative is not too sharp, and you get a brownish tone or print in sepia and wish to imitate an old print, before pressing the centre for plate mask, place print in some coffee; this will make the margin white to slightly yellow, and by varying the strength of the coffee you can get just the shade you require.

LENS CAP.

If you make your exposures with the lens cap, see that it is not too tight, and be careful, in taking it off, not to shake the camera. Many of the cameras are made so light that the slightest thing shakes them, and if you are not careful in taking off the cap in making an exposure you may get a blurred picture.

HINT ON PLATINUM PRINTING.

If you print in platinum and do not varnish your negatives, it is a good plan to warm them before placing them in the printing-frame; the film often absorbs moisture, and the moisture is taken up by the paper and causes what would otherwise and properly should be a bright print, to develop up rather flatly.

POSING OR EXPOSING?

By E. E. Weatherby.

I WAS pleased to see in the ANNUAL for 1898 that our friend, C. M. Giles, had the courage to attack one of the most glaring evils which has crept into our art—that of making immoral or unchaste pictures.

Perhaps some of your readers will charge us with being "prudes," but nevertheless this subject has appealed more strongly than any other to my mind since I determined to send a line to the ANNUAL.



Photographed by E. E. Weatherby

Does it not seem from some displays of so-called art (?) that the more vulgar and sensuous a picture is, the better it suits a vast number of people?

Is it not too often a case of "exposing" rather than "posing" on the part of the subject, and literally getting two "exposures" on one plate?

Does it not seem to be the ruling passion of late to *undress* for a sitting, rather than *dress* for it?

Of course great pretence is often made that the picture represents some ideal, is emblematical, allegorical, etc. Very nice excuse. Better call it "paregorical" and we would try hard to swallow the dose and rest easy.

It seems to be a fact that even in some of our better publications the less drapery a figure has, and the more the subject is "exposed," the more prominence it is given.

Another point—one of vast significance in this relation—is the

fact that these so-called ideal works are always made from *female subjects.*

Why? That is the point! Have we not all seen pictures, scattered broadcast in our latter-day publications, which we hardly dare show in our own homes to those who are pure and chaste?

Why is it? Do the people of to-day demand such stuff as intellectual food?

Do we want our wives, sisters, and daughters brought up in an artistic atmosphere repugnant with the odor of concert-halls and even lower places of amusement?

I will say by way of interpolation, that I have no reference to children in this article, although even in that class of subjects we sometimes find that the operator has deviated from what might, perchance, have been a fine ideal picture, to one whose only suggestion is, that the child has few if any clothes on, and feels mortified over the fact.

I do not believe I am making too strong a plea for morality at this time; my only wish is that this may reach the right parties and cause them to think of what they are doing.

One of the worst things in this line at present is the "medallion" picture of to-day.

Every imaginable title is given to it. The majority have no point except their lewdness.

"Psyches" are so thick one would almost think they came in flocks.

Take a glance at a few others. Here we see the drapery pulled aside, or raised, the "pose" never being thought of, so glaring is the "exposure." All animation seemingly suspended, all expression blank, nothing conveyed but the fact that the particular attitude was assumed so that certain charms (?) might be portrayed; certain portions of the figure exposed with no other meaning than that the subject was lacking in modesty and decency.

Have not we seen undressed frights seated on *papier maché* rocks, near a continuous ground of threatening clouds and awful breakers, trying to still the storm, or calm the demons of unrest by twanging a cheap brass lyre or Egyptian harp?

Any well-regulated and carefully nurtured storm which chanced to catch such a thing out on a rocky shore, would be sure to put on extra steam and wipe it off the face of the earth forever.

Why idealize such things? If we must have a truly ideal or model picture of anyone's power to quell the tempest, what more grand or glorious subject can we get than of Him who calmed the raging billows by simply saying, "Peace, be still."

In His life we get the true ideals by which to live, and they would make far more fitting ornaments for our homes, to be looked upon by our loved ones, than the questionable productions of sensuous and unprincipled photographers.



Photographed by JOHN RÖSCH.
Engraved by
NATIONAL PHOTO-ENGRAVING CO.,
New York.

BRONX RIVER.

Do not let your greed of gain run away with your nobler nature.

Do not prostitute our beautiful art to such a level; rather use it to the ennobling than to the debasing of your fellows.

To those who have not read the article on page 159 in last year's ANNUAL, I would say: Read it by all means, it is a sermon.

THE SELECTION AND CARE OF PHOTOGRAPHIC LENSES.

BY HAROLD SERRELL.

AMONG the many axioms given for our instruction in that book of all books, is one which reads "The light of the body is the eye." The eye is truly the lens of the body, giving to us visual evidence of things material.

If the eye is defective or injured, the results to us are impaired and defective. Good aplanatic eyes, free from astigmatism, are a great blessing and cannot be overestimated or too well cared for.

So a good photographic eye—a fine lens—is a joy forever; it must be used intelligently to be appreciated; it must be well cared for to be used with the best results. A good lens enables us to truthfully obtain photographic evidence—lasting impressions—of things material, and around which entwine the affections of the present and memories of the past.

In the selection of a lens, don't experiment or buy any, "said to be a good thing," that comes across your path. If one is not competent to select and test a lens, then seek out some prominent amateur friend and interest him in your cause to perform this duty; but don't, in future, blame the friend who has done his best in the selection.

It is well to purchase a lens the maker of which has a recognized reputation and standing, but always remember that the lenses of the same maker are not all equally good; there are fine and superfine, and with any lens one improves in the quality of work as the capabilities of the instrument become understood and the operator acquires efficiency by practice.

It would be an idle waste of words to expatiate on the merits or demerits of any make of lenses, but there are infallible rules by the exercise of which any one may form a very accurate decision as to a lens: viz, the metal part should be well, accurately, and tastefully made; the glass should be clear, crisp, sparkling, beautifully polished and free from scratches or surface abrasions.

To test the clearness of the glass, look through the lens at the sky (without any window intervening), and if the blue appears the

same shade of color as to the eye direct, the glass may be considered without color and clear ; but if the blue appears of a leaden hue the glass has a yellow cast, and it is safe to reject it, as it is also safe to reject glass shot full of minute black (carbon) specks, no matter what the maker claims to the contrary.

To test the crisp and sparkling qualities, and also the definition, hold the lens almost against the person, with the plane of the glass at an angle of 45° to vertical and horizontal planes and look down into the glass to observe the reflected image.

The clearer, sharper, and better defined this image is, the better the glass, and the more perfect index one has of the capabilities of the instrument and the result on the plate. In this one becomes more or less proficient with observation.

In the care of lenses, the writer believes that the best things the world provides can be spoiled both by misuse and by lack of intelligent use. Here a series of "don'ts" are pertinent, as follows:

Don't leave a lens lying around ; dust accumulates and curious people are liable to investigate and may thoughtlessly injure.

Don't leave a lens uncapped or the glasses unprotected; dust and foreign particles settle on the glass and their proper removal requires care.

Don't leave the glasses of a lens continuously exposed to the light, and particularly to strong light ; this is very liable to cause deterioration of the cementing balsam between the glasses of the combination, which destroys transparency and imparts a tinge of color, thus slowing the speed of the lens.

Don't attempt to remove dust or particles with the fingers, or with chamois, silk, or similar material. The pores of the skin and interstices of such oily substances as chamois and silk hold and retain gritty particles that will scratch the finely polished glass of a lens.

Dust and particles should be removed either by blowing or the application of a fine sable brush, thoroughly clean. A very good material for cleaning the lens glasses is an old linen handkerchief, washed clean and ironed without starching.

The very best material that has come to the writer's notice, is a very fine, soft, fibre paper sold expressly for this purpose by one of our large optical companies. Either of these materials can be used safely, and in cleaning after removing dust, breath lightly on the glass and carefully wipe clean.

For the best results, a lens should be strictly clean, without dust or the fog that sometimes accumulates during disuse or changes of atmospheric conditions. The thought of *strictly clean* (in a lens) once afforded an eminent divine a topic for one of his best sermons.

The strictly opposite position was once observed by the writer, in the lens of a professional photographer (whose class as a rule is indifferent of cleanliness), who attempted a very large group of

over one hundred wheelmen with very indifferent results, and with a wearying exposure that could have been safely reduced to less than half with a clean, bright instrument.

Verily, "as cleanliness is next to godliness," so is a fine, well-kept lens the eye to light the photographic body.

PHOTOGRAPHIC SURVEYS AND TOPOGRAPHICAL RAMBLES.

By S. E. Kelf.

NOTWITHSTANDING the increase year by year of those who photograph, survey work with the camera still moves very slowly. It need scarcely be reiterated that there is a strong desire on the part of many persons, especially amongst those who take a lively interest in scientific and literary pursuits, that photographic records of passing events should become national property. Side by side with written or printed historic records, photographic pictures of a permanent nature should be deposited in museums, town halls, and other buildings accessible to the community. Many large towns are still without any public library, museum, art gallery, or other place of an educational nature that is available to the public. In some cases, where there is a museum, the curator is dead set against photography in any form. From him you can have a learned dissertation on



Mapledurham Mill, Oxon-on-Thames



Andweil Mill, Haunts



Sandford Berks, on Luddon

the age of a rude canoe, hollowed out of the trunk of a tree, or a decided opinion, most minutely given, whether such and such a stone or flint implement belonged to the palæolithic or the neolithic age. This in preference to anything that is going on around us at the present day or within the living memory of man. At such a place, stuffed birds, broken pottery, Roman coins, go to make up the show, which is useful in its way, but might be made more useful with photographs of points of local interest or customs peculiar to the district. If there be any thing of a modern nature, it must be had from the missionaries, procured in some way from modern savages.

True, there may be something from the surrounding districts, but it must be prehistoric to find a place at any such museum. The curator, in fact, wants a modern education, so that the best photographic pictures that can be obtained may find a place under his care. To rely solely upon survey committees and upon amateurs is evidence of weakness. Many ought to be secured from those performing commercial work. There are two counties in England which have accomplished something in this direction—Warwick and Surrey.

The interesting county of Oxford, which from its seat of learning is known throughout the world, is also coming to the front in this matter. A committee has been formed for the purpose. Perhaps it would be as well to draw attention to this in detail. The circular just issued states: "At the annual Congress of Archæological Societies, held at Burlington House, London, in 1894, it was decided to organize a photographic survey of England and



Sheffield Bolton, Berks, on the Kennet

Wales, with a view of obtaining a permanent pictorial record of all objects of general and of local interest. The Oxford Architectural and Historical Society appointed, in 1897, a sub-committee to report on the best method of promoting such a photographic record for the County of Oxford and possibly certain portions of adjoining counties."



Hurley Mill, on Thames

But the most instructive portion of the circular gives the photographer not only what is required, but how it is to be done. This is classified, and under A we find, *Pre-Historic*, *Roman*, and *Anglo-Saxon remains*, *e.g.*, camps, dykes, tumuli, megalithic monuments, villas, cemeteries, etc. Under B, *Ecclesiastical Architecture*, *e.g.*, churches and abbeys, with their precincts, which should be represented in general views, exterior and interior. Separate photographs should be obtained for their more important details and contents, such as capitals, mouldings, window tracery, sepulchre monuments, wall painting, stained glass, iron- and wood-work, fonts, and furniture. Under C, *Domestic Architecture*, *e.g.*, castles, manor houses, parsonages, old tithe barns, cottages, etc., both in general view and detail. Under D, *Village Scenes*, illustrating the homes of the present generation. Under this head may be included wells, as well as pounds, stocks, etc. Under E, *Ethnological subjects*, such as dress, occupation, amusements, local customs and celebrations, *e.g.*, mumming, May-day feasts, morris-dancing, etc., also such customs and implements as are in a state of transition, owing to the introduction of machinery, *e.g.*, the use of the flail, plough, churn, etc. There are a few more headings, but those given sufficiently indicate in what direction the survey-camera man should follow. The size of the photographs is next dealt



Overy Mill, Dorchester, on Thames



Twyford, Berks, on Luddon

with. All photographs should be as large as possible; whole plate [6½ x 8½—ED.] preferred, but none less than quarter plate. These must be printed in a permanent process, *e.g.*, platinotype or carbon. That while artistic effect is a valuable addition, it should not be achieved at the sacrifice of the work illustrated; but the point of view should be chosen to show as clearly as possible the details of the subject. Also that some arrangement should be made to supply a scale in all illustrations, since without, many would be practically valueless; a three-feet rod or walking stick being recommended as most convenient. Enough has been written to show the importance of the task, and it is only the unthinking and selfish, living for the moment, taking no heed of the great changes that are being wrought in the habits of the people, that would be against the accomplishment of so desirable an object.

.

In a topographical ramble, as stated last year, you can have all the freedom your heart can wish for, and not be tied down to a foot rule, but in contradistinction you must forego all the glory of being connected with a work which may be handed down to posterity. You must not exclaim, "What has posterity ever done for me, that I should trouble about the matter?" Your forte, however, may be in picturing "gorse and heather" landscapes, or marshes and swamps, so that you may not care for the "collar" of a survey.

Now water- and wind-mills often offer nice pictures. There are many hundreds of these, certainly not all pictur-



Sonning, Oxon, on Thames

esque, yet worth a plate because of their evanescent existence, so to speak. They are so spread over wide districts, and often so far from main roads, that they take some time to secure. Although these mills have come down to us quietly through the past centuries, many of them are now not only seriously threatened but doomed. Several are burnt down, never to be rebuilt, illustrating

> "Where stood the tower, now grows the weed;
> Where stood the weed, the tower.
> No present hour its likeness leaves to any future hour."

One of the photographs show a mill which was burnt down some twenty years ago, very likely never to be rebuilt. But another shows on the left of the picture an old wall of a mill, which was destroyed also by fire, but quite near which a newer and improved mill has been erected. Most of the mills about the country, however, are falling into a state of desuetude and decay. Milling by stones is becoming obsolete. Roller mills can comparatively grind more wheat in a day by steam power than those which depend upon the height of the stream and use millstones, in a month. So several get into the hands of the wealthy landowner, and fine houses are erected near, the streams being a valuable addition to the property. One mill, illustrated, which has a large wheel that has stood still for years, is to let for its fishing facilities. Nor is it always certain that a tenant who has possessed it for fifty years can retain a mill. The wheel of one was taken away by a duke on whose estate it stood. It was suddenly conceived that the mill-wheel on a certain stream destroyed the trout on which some ten or twelve thousand pounds had been spent—part of money voted to the duke's predecessor by a grateful country. So there are many fine heads of water which here run to waste and which will do so for many a year.

THE ROLLER SQUEEGEE.

By Chapman Jones.

TO speak of a rollor squeegee is rather a contradiction in terms, but the expression has been so often used of late that it is well understood. The roller does not take the place of the ordinary squeegee, as, for example, in mounting carbon prints before development, but for some purposes, where a squeegee is of little if any use, it is a very efficient tool.

There are several forms of rollers to be purchased, but I wish here to point out the advantages of a home-made roller. It consists of a piece of thick walled india-rubber tubing or hose that is

pulled over a convenient length of broomstick, a few thicknesses of brown paper being interposed to make it a tight fit. For a smaller roller, obviously a stick of smaller diameter would be employed, such as those used for rolling lengths of colored fabrics and sensitive materials on. It has no handle to bend or break, but is used like the domestic rolling-pin by applying direct pressure to the roller itself. It is particularly serviceable in mounting prints, and also in gluing mounted prints upon a piece of thick mill-board or upon a cut-out mount preparatory to framing. After the pasted print is placed in position, a sheet of clean paper is placed on it, and then the roller is slowly passed over it once or twice. Any amount of pressure can be applied, or rather the pressure is limited only by the weight of the photographer. I have found it is a much more effective method of mounting than the usual one of rubbing down, especially for large prints.

WHAT TO PHOTOGRAPH.

By MATTHEW SURFACE.
Editor of *The Practical Photographer.*



THE amateur photographer is a funny fellow. Let him spend a guinea on his outfit, and you will find in the course of a week or two that he knows all about photography, and chemistry, and art, and those things, and unless he is quite an exception to the average he will in that short space of time have fixed his affections upon one or another aspect of photography, that is to say, he will either be a technical or an artistic man. If the former, he will pronounce every photograph bad that is not microscopically in focus on every plane; he will turn scornfully from every form of printing paper which has not a plate-glass-like surface, and he will devote all his time to experimenting with different developers.

The latter, however, will behave very differently. He will show you all sorts of different effects—most of them failures. He will soon discard ordinary printing processes, and take up carbon or platinotype, partly because those papers give more artistic results, and also in truth because he cannot manage that nasty toning process. His negatives, if you can get a chance to look at them, will be found hopelessly fogged or grossly under-exposed. The probability is, he will be exceedingly unsystematic, and the contents of his dark room "all of a heap."



Photographed by W. J. HUSTON.
Engraved by
GATCHEL & MANNING,
Philadelphia, Pa.

A CONVENTION PRIZE WINNER.

P. A. of A., 1898.





Gapny Gill Hole

Well now, what the sensible amateur photographer ought to aim at is to be a happy medium between these two extremes, to be a good technical photographer, capable of developing with some degree of chemical accuracy, pretty well acquainted with all regular processes, and master of at least one of them. He should have an eye for pictorial effect, a knowledge of the principal laws of composition. When possessed of all these qualifications, he will stand a fair chance of producing photographs worth looking at, and what is more, he will be a man that you can talk to. The extremist, whatever direction his idiosyncrasies may take, is a nuisance to society.

I am writing these words chiefly for the benefit of the novice, hoping that they may lead him into the right path. Supposing then that he has mastered the elements of photography, and is in the happy position of having an occasional day or half-day which he can give to practical work in the field, how can that time be utilized to the best advantage? Well, it is a very good thing to aim at making pictures, because even if unsuccessful the effort does an immense amount of good, leading the observer to analyze the beauties of nature, to understand them at least partially, and to train his mind in a proper appreciation of what is really beautiful, as compared with that which is only eye catching.



But even if the photographer has no very strong artistic leanings he may make his camera extremely valuable if he is an observant person, by merely going to different parts of the country and making records of whatever he sees which may be curious, uncommon, or interesting from either a topographical, geological, or other scientific point of view. Let him carry a note-book, but as an adjunct to the note-book the camera enables permanent records to be made of what



Oak How Needle

is seen, for examination and reference at any time.

It is a very sad thing indeed to see such very poor results brought home by most photographers when they go out into the field. I do not mean that the work is bad, but that the subjects are so desperately uninteresting. It is difficult to put oneself in the position of the rank and file. What induces them to take the miserable things they do is beyond my comprehension!

A. has been to the seaside; ask him to let you look at his prints when he returns. Your impression of the place he has visited will be that it consists of the sea, some sand with children throwing it about, a row of lodging-houses and the station behind. Yet there is not one single coast hamlet, no matter how small and insignificant, which does not offer to a thoughtful mind many an interesting subject to be photographed. Breaking waves it is true are a little hackneyed and not very easy to manage effectively; but children on the shore afford endless opportunities for pictures, not perhaps strictly artistic, yet uncommonly interesting. Yet nine out of ten make the mistake of photographing the whole of the beach in one magnificent failure, and there you have the Punch and Judy show, the niggers, and all the people included in the modest dimensions of perhaps 5 by 4 inches. It will not do, any more



The Thaw

than the old story of Atlas holding up the world on his back. The one is a physical, the other an artistic impossibility. Take your time about it, select little groups of children, watch for the right moment, and then snap. A little practice and you will have something worth showing to your friends when you get back. As to the rows of houses and the station, perhaps it would be well to leave them alone, and explore the country beyond when tired of the beach. No doubt there will be a windmill of ancient construction, an old farmhouse or two, possibly even a castle. At the very least you will find a few wind-blown trees or others of curious shape. If not, then descend to even smaller things, and photograph a few flowers *in situ*.

Be patient, be observant, be persevering, and as your experience grows from day to day you will gradually fall into the way of bringing home something better than views devoid of interest, not worth the developer they are to be plunged into.

The four or five illustrations accompanying may be useful as suggestions to the man who does not quite know "what to photograph."

MODIFICATION OF AN OLD METHOD FOR MAKING PANORAMIC AND STEREOSCOPIC PHOTOGRAPHS.

By O. G. Mason.

WITH the many changes in conditions and requirements attending the constant application of well established principles in art industries, it often becomes necessary to take up some old, almost forgotten method of work for the solution of problems by the best available means; very few old photographers have escaped demands upon their professional services which require considerable study and the exercise of no little ingenuity.

Many people, even among those recognized as belonging to the intelligent and well-informed classes, have so little knowledge of practical chemistry and optics that their photographer finds it necessary to give long lectures upon science to show the *how* and *why* their schemes are impractical, or they are quite likely to look upon him as one deficient in professional skill, or the necessary energy to carry out what to them appear far from difficult tasks.

The present methods of work with dry plates make it quite easy to successfully accomplish many photographic feats which by the old wet plate process were almost impossible.

The writer well remembers the work which came into his hands when during a military campaign it became necessary to

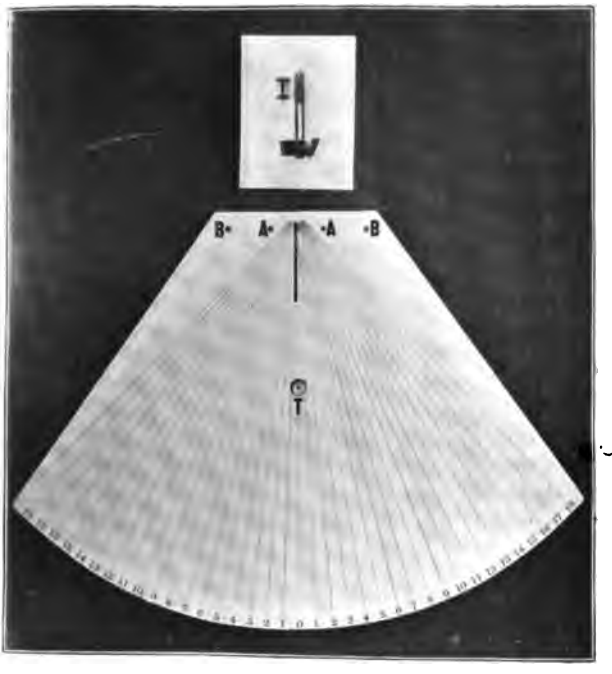


Fig. 1

photograph a wide section of country as seen from a given point, and it was desirable that the several plates for the work should be so made that the prints from them could be joined to form a continuous or panoramic picture. Those who have attempted such work with a large camera, not panoramic, know how the lines—especially architectural—in the prints will *not* join, as when the camera is turned upon the tripod screw each exposure is really made from a different point. To obviate this defect, the device shown in the illustrations herewith was constructed. In its use the variability in point of sight is avoided; as the camera swings upon a screw *exactly* under the *front* lens of the objective. This centre of motion is made for easy adjustment, suitable for the variations in length of lens mounts.

On the tripod top is mounted a graduated plan board—of any size suitable for the camera used; upon this board is drawn a series of angle lines counted from a central zero point, right and left as shown in Figure 1.

To the lower part of the camera front is fastened a strip of brass with a central slot for lengthening or shortening the distance of swing screw to



Fig. 2

position *under front lens.* This brass strip with swing and fastening screw—to attach it to front of camera base—are shown on small square card above plan board in Figure 1.



Fig. 3

Figure 2 shows position of camera on plan board for the first plate of the panoramic series. Figures 3 and 4 for the second and third plates, with the camera swung from the central point so that the images will lap enough on to the right and left of number one to make a good jointure when the prints are trimmed and mounted.

Note the number of the angle at which the centre of back of camera stands for the second plate, then swing to corresponding number on opposite side of zero for the third exposure, and so on until the desired field has been included, taking care that corresponding angles are used as the picture is extended to the right and left of the zero line.

By using the swing screw in holes A A and the angle scale, stereoscopic pictures may be made with a single objective and box.

If more projection—as for distant objects—is required, the swing screw is used in holes B B. With this device it is quite easy to make illustrations for the large Brewster stereoscope, which of late years has been little used on account of the difficulty of making prints suited to its requirements.

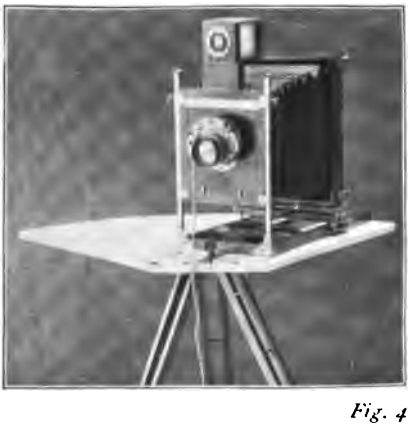


Fig. 4

The rapidity with which gelatine plates and films may be manipulated gives little chance for change of light, or objects in the field between the several exposures for stereoscopic or panoramic work, hence it is quite feasible to use the old single objective and box method by the mere addition of the simple device shown, and leave little chance for fear that the results may be unfavorably criticised.

A SUGGESTION AS TO THE JUDGING OF PICTURES AT PHOTOGRAPHIC CONVENTIONS.

By GUSTINE L. HURD.

THIS is a vexed subject. It is but rarely, I think, that the decision of the judges expresses anything like a unanimity of opinion of the members of the association; there is in most cases a large minority, if not a positive majority, that contends against its justice. One has but to go back through the history of the Photographers' Association of America to find that this assertion is well grounded. The duties of a judge (as I have occasion to know, having served many times in that capacity) constitute in themselves a thankless task. I remember being in a court of justice once when the judge said in making his decision: "I would like to disagree with myself." A judge in a photographic exhibition often confronts that dilemma. And at best the result is what three men can arrive at, each of whom, it is fair to suppose, is on terms of intimate friendship with some of the exhibitors. However fair a judge may mean to be, it is almost impossible not to be unconsciously influenced by that fact. Then, too, it is very hard to ignore established reputations, and do justice to the new exhibitor. And beyond all that, pictures appeal to different persons according to their individuality and cultivation. Some time ago a landscape picture in oil that I had just become possessed of was hanging upon the wall, when one of my friends stalked up before it, and after an attentive examination said: "I would like to know what you see in that picture." I replied: "If you don't see anything I can't tell you." It was a very quiet and unpicturesque subject, but handled with remarkable subtlety and feeling by the artist. While a bright man, my friend had none of that fine artistic feeling that would bring him into sympathy with the picture. So, in like manner, a man may be a very capable photographer, and still utterly incapable of appreciating the finer and more suggestive meaning of the best portraiture by photography.

Now it seems to me that a more excellent and satisfactory way would be to have the pictures judged by the association, and thus arrive at a concensus of opinion. If the decision was made by the votes of all the members, one important point would at least be gained, which I take it is as educational as any other feature of conventions—the work would be studied far more than it generally is. And what is decided by the majority should leave no cause for complaint. Blanks could be furnished each man, with enumeration of the different classes and the names of exhibitors, leaving the member to express his preference by checks opposite the names, as in the Australian method of voting at the polls.

This, of course, would do away with the marking of so many points for this and that, and sum it all up in the general value of the exhibit. Then some portrait painter of acknowledged ability might criticise the winning pictures from the platform.

There may be some objections to this method of judging which do not occur to me; but, so far as I can see, it would do away with much friction and secure more satisfactory results.

A WASTE OF TIME AND MONEY.

By Anti-Landscape.

AMATEURS are wasting a great deal of time and money uselessly in landscape work which, if diverted into other channels, would be productive of much better results at less expense. A careful examination of the work exhibited in the last exhibitions shows that very, very few amateurs have made a name in pure landscape work, and that those who have, depend almost entirely upon cloud, mist, and other atmospheric effects for their success. In other words, very few landscapes are up to exhibition form, and of those that are, none are taken upon bright days, except, perhaps, the "moonlights." Now, in view of these facts, would it not be wise for us all to drop landscapes? I for one say "yes" emphatically. I believe that if the same amount of time and enthusiasm were spent each year on other departments in photography that are now spent in chasing the elusive landscape across country, we would all be able to show much better results. Portrait work is by no means difficult, and good work can be done in an ordinary room. Figure work can be done indoors or out, and is perhaps the most charming branch of photography. Animal studies require patience, but the field is almost unworked. Flower studies may not be high art, but they are certainly beautiful if well handled. There are numerous branches of photography which will yield good results to the honest worker, results much more satisfactory than if the same work had been done on pure landscape. The stock houses are to blame for some of this landscape nonsense, for they sell "view" lenses, "view" cameras, and "landscape" outfits, and the poor amateur swallows the bait; the photographic press is also to blame for publishing so many ordinary "views" as good work, "views" that would be laughed out of the humblest country exhibition abroad. Now the reader may think that perhaps the writer can't take a landscape, so I will state frankly that one of my landscapes was hung at the last Paris Salon, and that although I have been taking photographs ten years, that one (barring one "fluke") was the only landscape taken in those ten

long years that was fit to exhibit. Ten years of work, dozens and dozens of plates, hours of drudgery, miles of walking, and one picture to show! My experience is by no means unique; I know one worker who is famous for figure work, famous in an international sense, too, who has tried for years to make a good pure landscape without success. I know of workers who have plodded away at landscape year in and year out without the least advance, who jumped into prominence after a few months at portraiture.

So I say with Hans Nix, "Don't do it." Don't waste time and money on poor landscapes, while so many charming branches of photography offer so much quicker, better, and easier reward.

PHOTOGRAPHY AND ART IN HALF-TONES.

By James B. Carrington.

IT is only rarely nowadays that you see, in the high-class magazines, the unassisted half-tone. By this I mean the attempt at satisfactory reproduction of drawings by photographic methods alone.

In the early days of process-plates we were so charmed with their softness and delicacy that for a time criticism was disarmed. Artists were glad to be freed from the domination of the wood-engraver, and publishers were quick to avail themselves of a means to rapidly and cheaply illustrate their books and magazines.

The old art of the wood-engraver, however, to which we owe so large a debt, survives in the best half-tones of to-day. Without retouching by the graver, most half-tones are flat and lacking, both in truth and snap. In the pages of *The Century*, *Scribner's*, and *Harper's* appear every month process-plates that have been completely transformed by the skilful handling of some engraver, whose long training in tint-cutting and appreciation of relative values on the wood-block have given him just the knowledge needed to relieve the photographic result of its monotony. It is not uncommon to find a full-page plate in one of these magazines that has been completely re-engraved by hand, and signed by the artist-engraver, who is often given credit in the contents for his work. Like everything else this re-engraving is too often carried to excess, or done so crudely as to nullify the good qualities of the foundation plate. It is only when the engraving is delicately done with the intention of assisting the process that the results are satisfactory. A good half-tone is way ahead of a badly engraved one. This only emphasizes the general rule that applies to all photography with regard to retouching. It is only justifiable in correcting obvious defects or exaggeration in the negative, and ceases to be good art when used as an end in itself.



Reproduced from plate by
GERLACK & SCHENK in Wien.
Engraved by
SEEBECK BROS.,
New York.

PHOTOGRAPHY FOR DECORATORS.

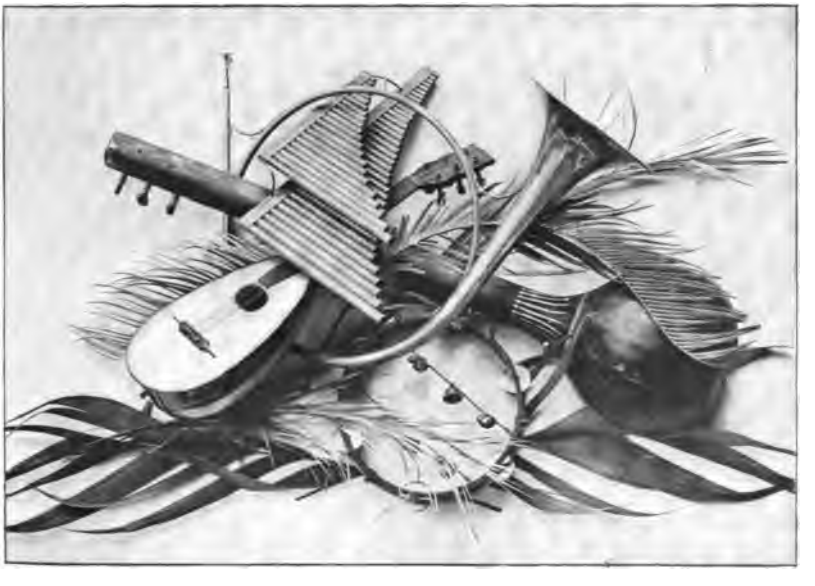
PHOTOGRAPHY FOR DECORATORS.

By Charles W. Canfield.



NE of the points about which there is no dispute is the value of photography in recording the varying phases and relations of *things*, whether due to chance or design. In the last analysis most landscape and architectural views are chance phases; the photographer has no control of his subject, but only of himself, and the result is best, in the opinion of most capable critics, when it directly and simply *records* without attempt to alter or meddle. There are, however, many cases in which photography preserves the results of design and arrangement, and its usefulness in this capacity is only partly understood or appreciated.

It was with a view to rendering available to artists, at all times



and in all places, studies of the decorative treatment of flowers and foliage, fruits and vegetables, animals and insects, all the varied arsenal, in short, of the decorators' art that Martin Gerlach, of Vienna, has undertaken the stupendous work of arranging in

naturalistic groups and photographing more than five hundred distinct varieties of plants, in addition to fruits, animals, and various accessories, such as musical instruments and other implements of art or trade.

There are many cases in which the artist who is not a photographer can utilize such results directly; in many others they are suggestively useful. As object-lessons, to be emulated by amateur photographers in particular, they are stimulating in the highest





degree. For any one who has passed the "reporting" stage in photography, to whom portraits of Farmer Jones's whitewashed cottage or unwashed pigs no longer seem, as at first, ample return for time and energy and plates expended, wide fields, and woods as well, are open. The camera may accompany the ramble, and perchance record the method of growth and natural state of leaf or vine or bough, and later show how

art can improve upon, or at any rate, adapt nature, by re-combining and arranging.

Of course such perfection as is shown in Herr Gerlach's results demands considerable experience and careful selection of lenses and controlling of light, so as to avoid distortion and false shadows and shades; but these difficulties are easily overcome by the determined experimenter, and add a zest to the struggle for success.

A HOLIDAY RAMBLE.

By M. W. Thompstone.

IT had long been my intention to spend a holiday among the marshes of the eastern counties of England, and October last year saw me on my way for a short visit to what is frequently called the "Holland of England." Although I had only a few days at my disposal, I spent a very pleasant time, the weather partaking more of the month of June than October.



Sunset at Heybridge

My wanderings led me in the first place to Essex, and there on the banks of the estuary of the Blackwater stands East Maldon, a veritable "Sleepy Hollow," where you may while away many pleasant hours, away from the toil and strife of our large manufacturing towns with their mad rush and struggle after wealth.



Sunset at Heybridge

The town, if such



Beeleigh

you may call it, stands on a small eminence, and consists of one main street, in which are situated the principal buildings, and another leading off it at right angles towards the railway station. It affords several interesting views, especially the fishing portion, with its quaint gabled and red-tiled cottages. On the beach lie drawn up the boats of the fishermen, amid a collection of nets and other implements appertaining to their craft; here is one having a coat of paint, and there at the quay side is a barge being loaded with hay, no doubt destined for the London market.

About an hour's walk from the town, along the sea wall, brings you to the little port of Heybridge, situated lower down on the estuary; here an artificial basin has been constructed, capable of holding several fair-sized vessels, and to which admission is obtained by means of a lock at high tide. The day I was there had been beautifully fine, not a cloud in the sky, but towards evening the wind from the sea blew a few towards the land, and I was fortunate in securing one or two very fine sunset effects.

Around Maldon are many picturesque spots, affording work for the camera; chief of these is Beeleigh, with its weir and quaint trees. Here is a curious picture of a lion's head formed by the bark on the trunk of a tree.



East Maldon

Southwold, one of the small east-coast watering places, is situated in the county of Suffolk, and has so far escaped being spoiled by the upper element; here you can enjoy a quiet rest amid pleasant surroundings. An old-fash-

ioned miniature railway transfers you to Southwold from the Great Eastern main line to Yarmouth from London, and it is with a feeling of delight that you find yourself free to spend a few days on the breezy downs of this little watering place.



Loading Hay, East Maldon

Close to the mouth of the river Blyth, and about three quarters of a mile south of Southwold, lies Walberswick, noted as a great resort for artists and a favorite hunting ground of many prominent photographers; here amid its ruined sheds and broken piers, you can work to your heart's content.



Walberswick

Further south is Dunwich, once a flourishing port and parliamentary borough, but the sea has encroached to such an extent as to swallow up six churches and the greater portion of the town itself; on the cliffs stands the ruin of another church, which has had to be abandoned owing to its foundations being gradually undermined by the hungry sea.



Coastguard Station, Southwold

Churches abound in the whole district, and their size shows that the population must have numbered considerably more than it does at the present time, for now the churches are little better than ruins, the services being held in what at one time was the chancel. Several of the churches have very fine in-

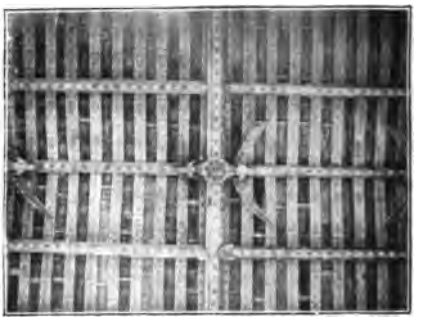
teriors, notably Southwold and Blythburgh; they also possess those queer little wooden images called "Jack of the Bell."

Another feature of the country is its wind-mills, which are used for draining purposes.

Space will not permit me to enlarge on the enjoyment and pleasure



Lion's Tree, Beeleigh



Roof, Blythburgh Church

to be obtained by a visit to this part of our island, for it possesses a charm peculiar to itself; suffice it to say, it was with regret I had to turn my footsteps homeward, but with the full intention of paying another visit at no distant date, to see those places that the shortness of time at my disposal had prevented my visiting.

TANK DEVELOPMENT.

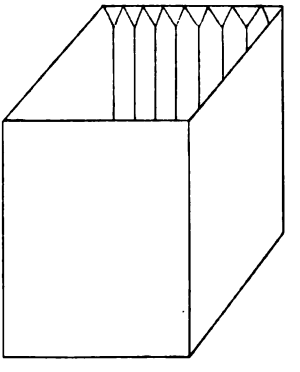
By John M. Nicol, Ph.D.

HE who merely "presses the button" and leaves some one else to "do the rest" knows nothing of the real pleasure of photography, and has no claim to be called a photographer. To "roam over hill and dale" with the camera under the arm gives a hitherto unknown charm to a holiday; and to photograph the latest baby or the last new dress brings him into closer friendship with both matron and maid; but the real heart-filling delight of the amateur comes from none of these. It is in the quiet solitude of the dark room, when his favorite developer has been poured over a plate that has been exposed on a pet subject, under conditions in every way to his liking, and while he watches for the first appearance of the higher lights, that it comes. If he is a photographer worthy of the name, selection and exposure have been carefully considered, and

he knows what he wants and how to get it. The appearance of the image is as if it were a creation, while it is also a revelation, from which he learns from each progressive step how to modify or control the next.

But this is only so with those who employ the stand-camera, and have learned by experience that half a dozen plates are enough, and more than enough, for any day's work. For the devotee of the hand-camera, and especially those of the magazine variety, there is no such pleasure in store. In spite of the teachings of wiser men, and in spite of his oft-repeated good resolutions, he goes about snapping at every likely and unlikely subject that takes his fancy, forgetful of the limitations of his instrument, and finds himself confronted on his return from even a brief outing with many dozens of more or less under-exposed plates, the development of which is a dreadful drudgery.

The remedy is "tank development." The space at my disposal will not allow of proof that less than half a grain of pyro, or any of the modern developers, is required for the development of a 4 x 5 plate, nor that for under-exposures, weak solutions are better than strong; and so I ask the reader to believe that the following is the result of experience, and may be relied on.



By tank development is to be understood the development of two or more dozens of plates in a vertical position, preferably back to back, in a suitably grooved box.

The accompanying cut represents a rubber fixing-box, to be got from most stock dealers, and only needs to be fitted with a cardboard cover, deep enough to be light-tight Any ordinary developing solution will do, provided it be diluted so as to contain not more than half a grain of the reducer in each ounce; but the following leaves nothing to be desired:

Ortol	30 grains.
Potassium metabisulphite	15 "
Sodium sulphite crystals	200 "
Sodium carbonate crystals	200 "
Potassium bromide	5 "
Water	50 ounces.

It is only necessary to place the plates back to back in the tank, pour in sufficient developing solution to a little more than cover them, put on the cover, and leave them alone, till morning if started at night, or till night if started before going to business in the morning.

Washing, fixing, and final washing is done without removing the plates from the tank; and, in sober truth, the two dozen snap-shots are, in this way, developed with equal certainty and less trouble than would be one plate in the ordinary way.

THE NAVAL AND MILITARY USE OF KITE PHOTOGRAPHY IN TIME OF WAR.

By William A. Eddy.

ON May 30, 1895, I succeeded in taking what is probably the first horizontal photographic view in the world with a camera sustained in the air by means of a tandem line of my tailless kites devised in 1891. Between 1886 and 1891, Archibald, of England, and Batut and Wenz, of France, had succeeded in taking a few map views, the lens of the camera pointing directly at the earth. Wenz, of Paris, has sent me a map view, which shows a somewhat circumscribed map-like circle of houses and a river, possibly the Seine, at Paris. So far as I know, the system of Wenz and Batut is to sustain a single camera by means of one kite, and I believe Batut took two pictures in quick succession, together with a barometric reading—all done automatically. Archibald's pictures were possibly taken by means of one or more kites, one fastened to the back of another. My method of aerial photography differs from that of the European experimenters, in



Blue Hill Observatory, Mass., August, 1895. Figure in foreground is W. A. Eddy.

the respect that the camera is suspended several hundred feet below the kites, with the lens pointing in a nearly horizontal direction. It also differs, as far as I know, from Wenz and Batut's method, in that the camera is attached to the kite-string far below several kites flown tandem, with individual lines; while it differs from Archibald's system in that the camera is horizontal, and takes a perspective view. On June 6, 1897, I sent up into the air two cameras on a circular platform, and snapped them simultaneously, thereby greatly extending the range of view. I have planned to send up five wide angle lens cameras on one whirling circular platform, so that the entire horizon line can be taken at the same instant by the simultaneous snapping of all the cameras. The present system of discharging the cameras, is by means of a string which operates the several shutters of the cameras at the same moment, but later the shutters will be operated by electricity, the kite line itself consisting of double insulated wire, enabling me to operate the cameras with a return circuit. The discoveries of Tesla, who believes that one wire, without a return circuit, will carry light and heat will no doubt still further simplify the electric part of the apparatus by doing away with a double wire leading to and from the cameras in mid air. This question of a double wire, however, is not very important, since very great strength in proportion to weight of line is required to lift five cameras, weighing in all, twelve pounds, the pull at the earth being fifteen or twenty times the weight of the cameras. The chief danger to avoid, is a break in the main kite cable. If the pull is too light, the cameras will not be lifted, if too heavy, the line will break, and the cameras be dragged through tree tops or dropped into the water. Of



Fairmount Park, Philadelphia, Pa., May 15, 1897

course a double wire with its return electric circuit will increase the strength of the cable.

In the intermediate regions, between the trade-winds and those of the north temperate zone, there is a region of relatively light winds, where the army may often have difficulty in operating kite cameras, owing to want of wind; but in the navy the light winds or calms would not prevent the ascension of the aerial cameras, providing the vessel moved at the rate of twelve or fifteen miles an hour, provided the particular kites which I devised in 1891, are used, since they are light wind flyers. I have found by experience, however, in the interior of the United States, away from coast winds, that while the wind is light and unsatisfactory, mid air photographs can be taken about four days in seven, while along the great lakes, and to the northward, they can be taken five days in seven, except in July and August, when the winds are sluggish. Of course no such disability appears at sea, because the motion of the vessel will sustain the especially constructed light kites aloft.

In the navy the five cameras can take the entire horizon line at sea, giving views of vessels below the horizon. Since the cameras are numbered, to correspond with a chart at the deck, the direction of the invisible vessel is revealed by the number of the camera taking it. As the wind shifts the cameras, which are fixed in their pointing direction as related to each other, the chart at the deck is shifted to correspond to the positions of the cameras aloft at the moment the pictures are taken. Another improvement now under way is, that as the pictures are taken, the new plates are to be forced into position by the same motion that operates the camera.



State Camp, Peekskill, N. Y., June 20, 1897

It is obvious that the location of an enemy's fleet would be revealed, since at a height of 900 feet the horizon recedes to a distance of forty miles, not taking into account the refraction of light. By narrowing the diaphram of the cameras pointing toward a setting sun, the fogging of films by excess of light can doubtless be avoided, and by the use of tele-photo lenses within limits of magnification to be decided by experiment, considerable definition can be made to appear in the photograph at a distance of twenty or thirty miles. For navy and army purposes the masses are the important thing. The rising columns of dust from wagon-trains, the breaking away of tropical vegetation by army engineers for the passing of siege-guns and light artillery would all be shown by definite lines of change, and by masses of light and shade in the photographs, and fortifications would be clearly revealed. So far I have taken about 400 mid air kite photographs, and with my multiplying simultaneous cameras, I shall take a vastly greater number in a much shorter time.



New Jersey Athletic Club, Bayonne, N. J., May 30, 1896

THE COLOR OF THE FINISHED PRINT.

By E. L. Bowlus.

IN the realm of photography much remains to be explained. That which some affirm, others deny. However this may be, photographic processes are essentially chemical in nature ; but the intimate nature of many of the products formed, the mechanism of their formation, and the laws governing the same are as yet but faintly comprehended. So, for the present,

we must regard them as facts of co-existence, and forsake the fascinating field of speculation. I shall, therefore, confine myself to the solid facts of my own experience in our study of the color of the finished print.

For the sake of completeness, I must make passing mention of the psychological element of pleasure we experience in viewing a print having an "excellent tone." I suggest association or custom, and education as potent factors in the development of this feeling. It is plainly evident that the mat surface, and coal-black color of the present photograph is the result of education and fashion, or custom.

The relation of negative to the color of the finished print is an intimate one. It is a fact of my own experience that extreme over and under-exposure produce prints, in general, of the same color-tone when toned in the same bath. Such pictures produce a certain flatness, a lack of contrast between shade and highlight. They are devoid of the rich contrast and color-tone of the properly timed plate. Instantaneous under-exposure of foliage and dark areas in general produce the rich, dark-brown, purple, or velvety black, so agreeable to many eyes. What then, in the negative, is the immediate cause of these variations of color-tone? Is it physical or chemical, molecular or atomic? I know not. It is sufficient to say that, working with good materials and under normal conditions, correct exposure produces pleasing prints, while incorrect exposure does not. Correct exposure of plate, as well as accurate printing, and a normally active toning bath are essential in the formation of the high-grade print, whose excellence is unmistakably dependent upon the character of the negative.

Assuming normal working conditions, the pleasing character of the color-tone of a print depends, to a great extent, upon the granularity of the gold deposit; but it may also vary with the depth of printing, and, therefore, is dependent upon the quantity of light decomposition of the sensitive medium. Deep printing produces great chemical decomposition, which, of itself, constitutes exceedingly favorable conditions for the rapid deposition of gold, inasmuch as the points most vulnerable to attack—that is to say, the molecules of sub-salt so formed and subject to attack, are highly increased; consequently there is a variation of color due to the greater density and depth of the deposit, resulting from the great chemical decomposition produced by deep printing.

In any phenomenon a certain definite order of events leads up to a given effect, and so it is that, in order to repeat this phenomenon, the attending physical and chemical conditions, as well as the definite order of events, must be reproduced. As a particular type of ordinary experience, the phenomenon of toning forms no

exception. Its successful issue is dependent upon certain normal conditions of environment. Thus the water should be uncontaminated with foreign salts. The temperature of bath may vary between the limits, 70° F.–90° F., but the general concensus of opinion is 70° F. The ratio of gold to water should be in or about 1 grain to 8 ounces, as it is not the absolute amount of gold present, but the ratio of gold to water that determines the efficiency of bath. Lastly, and most important of all, the bath should be neutral, or slightly alkaline.

Knowing the normal conditions of toning, we can easily learn the relation of abnormal conditions to the color-tone of the finished print, simply by varying each determinate factor in the toning bath. Heat accelerates and cold retards chemical action. Temperatures exceeding the maximum of 90° F. are apt to induce too rapid toning, with consequent production of a slaty hue to the finished print; while temperatures much below 70° F. retard the deposition of gold, and produce a very fine deposit of "ruby gold," which lends to the print a reddish hue. Almost the same result obtains when the ratio of gold to the amount of solution varies within wide limits. Correction of difficulty is obtained by ascertaining correct temperature for the strength of bath. At 90° F. a weak bath will work about as well as a normal one at 70° F. By all means have a neutral, or slightly alkaline bath. This is absolutely necessary to a good tone on the finished print. The reason is a chemical one, and is reducible, ultimately, to a question of the nature or affinity of the elementary bodies concerned. To neutralize, a pinch of chalk is all that is necessary. The free acid of the gold chloride attacks the chalk, and is soon neutralized, while the product formed is dissolved, and renders the bath weakly alkaline. With the modern gelatino or collodio-chloride papers, borax is usually recommended. And just here I would advise the amateur to add the *gold* to borax, and not *vice versa*. This peculiarity may be ascribed to the "mass action" of the substances involved in the reaction.

To do this make a test experiment. Prepare a solution of borax, and add a sufficient amount of it drop by drop from a pipette to a small measured quantity of your gold-chloride stock solution, shaking occasionally, until the red color of a piece of blue litmus paper, previously placed in gold solution, turns blue. Proceed cautiously, for one drop may change the color instantly. Count the number of drops, and you then have the ratio of borax solution to gold solution.

To prepare a toning solution, place the ascertained number of drops of borax solution in a suitable receptacle, and add the gold solution, taking care to add a slightly smaller amount than used in test experiment. Then dilute to normal amount of water, and let stand for ten to twelve hours before using. In the case of small

quantities of toning bath, where one can be exact, determine, in drops, the amount of gold-chloride stock solution to be used.

Now, to resume the thread of my article, the color of finished print varies with the acidity and alkalinity of bath. In an acid toning bath, prints become poor and "measly." The function of an alkali is to promote a gradual and more even deposit of gold. A large excess of alkali will so retard the deposit that the finished print will invariably assume a reddish hue from the very fine deposit of "ruby gold" so induced. As stated above, the color of finished print depends upon the granularity of the gold deposit—that is to say, the larger the granules, the bluer and more pleasing the color of the finished print. This coarse state of division of gold deposit can be attained only by observing normal conditions of toning.

The color of the finished print is injured by "sulphurization." A fixing bath should never be acid, and if so, should be neutralized with ammonia. An acid fixing bath will produce yellow high-lights through decomposition of the hyposulphite of soda by the acid and deposition of sulphur in the film. This reaction is termed sulphurization."

F 7.7

By Henry Wenzel, Jr.

I WOULD like to inquire the reason for the comparative non-use, save when imperative, of the larger apertures of lenses of the above or greater intensity, but particularly of the stops F 7.5, F 7.7, and F 8, as full apertures of the anastigmats and double-anastigmats of the Zeiss, Goerz, and other types, which at their greatest intensities are guaranteed to cover their prescribed plates sharply to the corners, giving equal illumination and definition over the entire field.

The habit of "stopping down" appears to me to be one of convenience rather than of intelligence. Intelligent use of the diaphragms would seem to demand the use of larger stops than are generally employed, those of smaller aperture eliminating the atmospheric element to such a degree that were it not for the comparative size of objects far and near we might infer them all to be in one plane. The larger apertures, therefore, should be employed where a proper rendering of distances is desirable, and there are but few instances in which it is not. If the smaller apertures are employed to secure definition, there is no excuse for the practice with the above-mentioned lenses.

Assuming that he understands the capabilities of his lens, there can be but one other reason why the possessor of one of these

lenses chooses to stop it down rather than to employ it at its fullest value; this reason I have stated—convenience. The approximate exposures for the smaller apertures are known, or may be ascertained without trouble. Furthermore, these exposures are easily made and without the necessity of employing a shutter. Inquiry as to the proper exposure for F 7.5 and F 7. 7, however, is wellnigh useless; the exposure is not easily determined, seemingly, and when arrived at is found to necessitate the use of a shutter, but no shutter is to be found with which may be made the exact exposures one has so carefully determined. But these apparent inconveniences are not so real in practice as to warrant the employment of smaller apertures merely for the sake of convenience. Were the proportionate exposures for F7.5, F 7.7, and F 8 known, the user would perhaps take no thought for the proper exposure for the full aperture of his lens, simply using it as F 8, and terming the exposure a full one. The relative exposures required by the above apertures, as against F 32, F 45, and F 64 is as $\frac{1}{18}$, $\frac{1}{17}$, $\frac{1}{16}$, is to 1, 2, and 4. It will be noticed that the exposure for F 32 being known, it is only necessary to divide the same by 18 and 17 to obtain the proportionate exposures for F 7.5 and F 7.7 respectively, making the calculation for either of these diaphragms as simple as for any other. For ordinary landscape, with bright foreground, the most rapid exposure necessitated by the use of F 7.7, at noon in mid-summer is $\frac{1}{45}$ second, but usually $\frac{1}{35}$; the slowest in winter at the same hour, $\frac{1}{10}$. For



Photographed by H. WENZEL, Jr.

HOME PORTRAITURE.
F 7.7 STOP ON STANLEY S 50 PLATE.

open landscape the exposures range from $\frac{1}{90}$ in summer to $\frac{1}{20}$ in winter under the same conditions, all these exposures being calculated for the fastest of American plates, and for all plates of speed F 90 on the speed card accompanying the Wynne exposure meter.

The use of the Wynne meter reduces the matter of exposure to a scientific basis. It precludes the use of a shutter of unknown speed, for it demands that all exposures be accurately timed, not excepting "snap-shots," so-called. Subject and lighting, plate and diaphragm, are so nicely computed into definite exposures for the whole, that, taking no thought for the speed



Photographed by H. WENZEL, Jr.

CITY HALL, SALT LAKE CITY.
F 7.7 STOP AND COLOR SCREEN ON CRAMER CROWN PLATE.

of plate used, the prevailing conditions at the time of making the exposure, the diaphragm employed, or the subject photographed, upon proceeding to develop any number of plates they may all be placed in one solution, confident that they will develop as uniformly as if subject and lighting, plate and diaphragm, were the same in every instance.

Below I give a table of actinometer readings from February, to July 15, 1898, inclusive. This table shows the full range of exposures from the fastest to the slowest throughout the year, with various stops on a variety of plates, from which may easily be computed the exposure for any diaphragm on any of the plates given.



Photographed by HENRY WENZEL, Jr.
Engraved by
SERBECK BROS.,
New York.

THE SMITHY.

F 16 STOP ON STANLEY S 50 PLATE.

ACTINOMETER TIME IN BRIGHT SUNLIGHT.

(Number of seconds in which sensitive paper colored to standard tint.)

Noon temperature in shade.	12°	45°	50°	70°	50°	60°	75°	70°	80°	90°	95°	95°
	Febr'ary		March		April		May		June		July *	
	1	15	1	15	1	15	1	15	1	15	1	15
12 M.	16	12	10	8	10	8	8	6	5	4	3	3
11 A. M., 1 P. M.	20	15	12	10	12	10	10	8	5	4	3	3
10 " 2 "	24	18	15	12	15	12	12	10	5	4	3	3
9 " 3 "	28	21	18	15	18	15	15	12	5	4	3	3
8 " 4 "	55	30	21	18	21	18	18	15	6	4	4	4
7 " 5 "	..	..	70	35	70	30	25	20	7	6	5	5
6 " 6 "	..	..	..	..	..	..	..	..	20	12	8	8

The above figures represent what would have been the proper exposures, in the vicinity of New York City, for landscape in bright sunlight with bright foreground, on each of the following brands of plates, with the stops given.

AMERICAN PLATES.

Carbutt's Keystone A	F	11	Record Dry Plate R	F	64
" " B	F	25	" " M	F	50
			" " S	F	45
" Special No. 25	F	50	Forbes' Landscape	F	56
" Eclipse S. 27	F	64	" Instantaneous S	F	90
" Ortho Portrait			Seed, No. S. 23	F	64
" S. 23	F	39	" Extra Rapid S	F	90
" " S. 27	F	50	" " No. 27	F	90
Cramer's Crown Lighting	F	90	Standard, S. 50	F	64
" Banner Lighting	F	78	" Ex. Rapid	F	56
" Isochromatic			Stanley, S. 35	F	64
" Medium	F	56	" S. 50	F	90
" " Instant's	F	90	Wuestner's Non-H. I. Ortho	F	56
Blair's Film, 25	F	56			

ENGLISH PLATES.

A. Perron Extra Rapid	F	45	Beernaert's Ordinary C	F	39
Austin Edwards' Ord Film	F	56	" Extra Rapid A	F	90
" " Inst	F	78	" Rapid	F	56
" " Double Inst	F	90	Blair Film	F	56
" " Set'loid F'm	F	64	† Cadett's Plates		
Autotype Rapid	F	90	Climax	F	45
Barnet Ordinary	F	45	Dr. Smith Ex. Rapidity	F	90
" Studio	F	56	" Instantaneous	F	56
" Extra Rapid	F	64	Eastman Film (28 W)	F	64
" Rocket	F	90	Edwards' Spec. Portrait	F	64

* 12 M. to 3 P.M. are average readings; fastest 2, slowest 4.

† These plates are marked with Hunter and Driffield numbers, the comparative speeds of which are given in table on page 114.



Photographed by HENRY WENZEL, Jr.
Engraved by
SERBECK BROS.,
New York.

THE SMITHY.

F 16 STOP ON STANLEY S 50 PLATE.

ACTINOMETER TIME IN BRIGHT SUNLIGHT.

(Number of seconds in which sensitive paper colored to standard tint.)

Noon temperature in shade.	12°	45°	50°	70°	50°	60°	75°	70°	80°	90°	95°	95°
	Febr'ary		March		April		May		June		July *	
	1	15	1	15	1	15	1	15	1	15	1	15
12 M.	16	12	10	8	10	8	8	6	5	4	3	3
11 A. M., 1 P. M.	20	15	12	10	12	10	10	8	5	4	3	3
10 " 2 "	24	18	15	12	15	12	12	10	5	4	3	3
9 " 3 "	28	21	18	15	18	15	15	12	5	4	3	3
8 " 4 "	55	30	21	18	21	18	18	15	6	4	4	4
7 " 5 "	..	..	70	35	70	30	25	20	7	6	5	5
6 " 6 "	..	..	..	..	..	..	..	..	20	12	8	8

The above figures represent what would have been the proper exposures, in the vicinity of New York City, for landscape in bright sunlight with bright foreground, on each of the following brands of plates, with the stops given.

AMERICAN PLATES.

Carbutt's Keystone A	F	11	Record Dry Plate R	F	64
" " B	F	25	" " M	F	50
			" " S	F	45
" Special No. 25	F	50	Forbes' Landscape	F	56
" Eclipse S. 27	F	64	" Instantaneous S	F	90
" Ortho Portrait			Seed, No. S. 23	F	64
" S. 23	F	39	" Extra Rapid S	F	90
" " S. 27	F	50	" " No. 27	F	90
Cramer's Crown Lighting	F	90	Standard, S. 50	F	64
" Banner Lighting	F	78	" Ex. Rapid	F	56
" Isochromatic			Stanley, S. 35	F	64
" Medium	F	56	" S. 50	F	90
" " Instant's	F	90	Wuestner's Non-H. I. Ortho	F	56
Blair's Film, 25	F	56			

ENGLISH PLATES.

A. Perron Extra Rapid	F	45	Beernaert's Ordinary C	F	39
Austin Edwards' Ord Film	F	56	" Extra Rapid A	F	90
" " Inst	F	78	" Rapid	F	56
" " Double Inst	F	90	Blair Film	F	56
" " Set'loid F'm	F	64	† Cadett's Plates		
Autotype Rapid	F	90	Climax	F	45
Barnet Ordinary	F	45	Dr. Smith Ex. Rapidity	F	90
" Studio	F	56	" Instantaneous	F	56
" Extra Rapid	F	64	Eastman Film (28 W)	F	64
" Rocket	F	90	Edwards' Spec. Portrait	F	64

* 12 M. to 3 P.M. are average readings; fastest 2, slowest 4.

† These plates are marked with Hunter and Driffield numbers, the comparative speeds of which are given in table on page 114.

Edwards' Snap Shot	F	90	Mawson	F	101
" " " Iso	F	78	" Castle	F	56
" Medium Iso	F	45	" Photo Mech'l	F	16
" Instantaneous	F	46	" Electric	F	78
England Photo Mechl	F	16	Monckoven Ex. Rap	F	90
Fitch Films, Extra Rapid	F	64	Paget XXX	F	64
" " Ordinary	F	45	" XXXXX	F	101
" " Rapid	F	56	" Phœnix	F	45
Gem Universal	F	56	Premier Ordinary	F	39
" Meteor	F	78	" Studio	F	45
Graffe & Jougla Ex. Rap	F	45	" Extra Rapid	F	90
" " Inst	F	78	Sandell Landscape	F	23
Griershabr Ex. Rapid	F	64	" Ordinary	F	45
Guillimenot	F	78	" Special Express	F	78
Hill Norris, Col. Med	F	14	Smith's Tourist	F	56
Ilford Ordinary	F	45	Thomas, Sp. Landscape	F	23
" Empress	F	56	" Extra Rapid	F	64
" Spec. Rapid	F	101	" Med. Anti-Hal'n	F	45
" Medium Iso	F	45	" Ultra Rapid	F	90
" Photo Mech'l	F	20	" Isochromatic	F	45
Imperial Slow Ordinary	F	56	Verel's 60 times	F	90
" Rapid	F	78	" Matchless	F	56
" Special Rapid	F	90	" Cathcart	F	64
" Flash Light	F	101	" Runaway	F	64
" Photo Mechl	F	28	Wellington & Ward Neg. Paper	F	39
" Sovereign	F	64	" " Neg. Film	F	56
Lomberg	F	78	Wratten, Ordinary	F	28
Lumiere Rapid	F	64	" Instantaneous	F	64
" Extra Rapid	F	90	" Drop Shutter	F	78
* Marion's Plates					

H. & D. No. 200=F 128; 150=F 111; 125=F 100; 100=F 90; 87=F 84; 75=F 78; 62=F 71; 50=F 64; 43=F 60; 37=F 56; 32=F 50; 25=F 45; 18=F 39; 12=F 32; 9=F 28.

To obtain the exposure for F 7.7 use the above figures as numerators of a fraction of which 136 is the denominator. For instance, July 1, noon, stop F 7.7, exposure $\frac{3}{136}=\frac{1}{45}$ second; June 1, $\frac{4}{136}=\frac{1}{34}$, very nearly.

The above exposures and the large majority of the fractional exposures necessitated by the use of so large an aperture are provided for by the numerous speeds of the "Triplex" shutter. I am not aware that any other shutter will answer the purpose so well.

To the advocates of "feeling," "intuition," or "judgment" in the matter of exposure, I beg to say that nothing short of knowledge is of any use in the field of rapid exposures into which we are introduced by the use of very large apertures. Mistakes of feeling and judgment amounting to a full second are not thought to be serious when using some of the smaller apertures, say F 64 for example. The proportionate allowance for error with F 7.7 would be $\frac{1}{70}$ second, which is virtually no allowance at all.

* These plates are marked with Hunter and Driffield numbers, the comparative speeds of which are given in table above.

It is evident that "feeling" and "judgment," though well enough in their place, are entirely out of place here.

I am certain that were it not for the Wynne meter I should never have attempted to employ large apertures for such a



Photographed by H. WENZEL, Jr. OVERLOOKING CRAGSMOOR.
F 7.7 STOP, STANLEY S 50 PLATE.

variety of work as the accompanying half-tones illustrate. To those who pooh! pooh! the use of an actinometer, I beg to commend these first efforts of a novice, giving full credit to the little instrument on which I placed my reliance—the Wynne Infallible Exposure Meter.

PHOTOGRAPHIC SURVEYS AND SURVEYING BY PHOTOGRAPHY.

J. H. HARVEY.

SO-called "photographic surveys" are becoming fashionable, and as, judging by remarks which I have heard and by some that I have seen in print, the term seems to have created a little confusion and appears to be imperfectly understood, a word or two of explanation will not perhaps be amiss.

As the expression is generally used among photographic societies and even by some photographic magazines, it refers to a series of photographs made in any particular locality for the

purpose of illustrating its buildings, monuments, views, etc., in order that prints from the negatives may be retained by some public or scientific body as records, and so show what the general appearance of the neighborhood illustrated was at any definite time, so that changes may be easily noted.

Some of these are in progress in Great Britain at the present time.

The scientific, but less generally understood, meaning of the term is, "a survey in which the bearings of all points in a locality are obtained by the aid of the camera, instead of with the theodolite." This branch of science is almost as old as practical photography itself. It was used in France upwards of forty years ago, and has been adopted to a greater or less extent in other countries, notably in Italy and Canada. I have been recently informed that it has been introduced for the mapping of the country in the neighborhood of the Yukon gold field.

It is to be regretted that this confusion should exist, and that the more recent system of recording the whole of the notable buildings etc. of a district should have usurped the term which properly belongs to a far older branch of photography, though this has evidently resulted from want of acquaintance with the existence of the older science.

Surveying by photography has been treated upon more than once in previous volumes of the ANNUAL.

I have no intention of trying to discount the value of the recording branch of the science, for this is a most valuable and interesting undertaking, but the older branch possesses a much greater amount of practical value. The former will always be the popular branch, as the latter can be used by specialists only, and it is considered that this description of work should be clearly distinguished from that which aims at making records for historical purposes, or as matters of curiosity.

ON THE GOLF-LINKS WITH A HAND CAMERA.

BY MISS ADELAIDE SKEEL.

ON the principle that outsiders see the most of the game, I, who never played golf in my life, yesterday, hand camera in hand, followed some enthusiasts over the links. Doubtless a scientific writer would begin an illustrated article by photographing a set of clubs, and I confess there is a certain weird picturesqueness in the names of *putting cleek*, *niblick*, *bulger-brassey*, *mid-iron* and *approaching maschie*, nevertheless my first shot was at a group of waiting caddies.

There is, I think, a great future for the caddy. Before the introduction of golf, these boys were mere boys. They went in swimming, went fishing, did errands sometimes, and when a circus



Waiting Caddies



First Strike from the Teeing Ground

was coming to town earned money weeding gardens, and they all rode wheels, and went from orchard to orchard, saying,—

"*Mister*, can we have some apples?"

Now they are caddies and nothing else. They usually play better than the ladies whose clubs they carry, and tournaments with prizes are not uncommon. They have codes and rules of their own, and are strict



Sometimes a Man



At the Brook

concerning the admission of any new member. They are usually bare-footed, and their language would not always grace a Sunday-school, but their blunders are meant for manliness.

My next view was of a girl on the teeing ground. Why, teeing ground, I do n't know, nor does anyone. If you ask, you are told that "the game is English." The teeing ground looks like the base of a large pyramid, made of mud, with grassy sides. The player stoops down and forms a small dirt cone on which she places her ball. Do you see how easy it is? Then she strikes, so!

Unlike boys, girls are usually girls, whether awheel in the open or at home at work on a sampler; hence a girl with a driver on a teeing ground is just a girl. She may be a beginner or a champion; she generally talks, laughs, blushes, screams, exults, despairs. Her appearance on this occasion is ever jaunty, and it is the fad of the hour to be hatless, although next season may decree the wearing of many veils. Sometimes a man takes the next turn



At the Stile



Her Pose was Fetching

in which case the girl player hurries on after her ball and her caddy, for golf is not specially a *tête-à-tête* game.

To walk over the links of a good golf course is in itself a pleasant pastime, although I am of the opinion of a small terrier which accompanied me, that the delight is enhanced if there be side issues. He found his in the surreptitious chasing of young chickens and the barking at cows grazing in adjacent fields, while I looked away from the players at the loveliness of all earth and sky on a clear August morning. The course lay through stiles and over brooks, and I caught several good groups at these obstructive points.

The bunker is a grassy mound not unlike the outworks of a fort, and it seems possible that some patriotic societies might mistake them for unmarked bulwarks of defence. To loft one's ball over,

or drive it through a bunker, is a feat of skill, but whether the girl I photographed used her maschie, mid-iron, or niblick I dare not say. I merely state that her pose was fetching. It is easy to see, however, from the other view, that bunkers are good places on which to rest.



Resting on a Bunker

To my infinite regret I had not films enough to take the players on every green, nor was I able to photograph a situation which bore the deliciously romantic title of a *beautiful hazard*, but as a final shot I took a group of earnest players about the last hole, with a dispassionate caddy not far off.



At the Finish

I learned from their conversation that, unlike whist, the fewer points or strokes the higher the score, also to—

Drive furiously—Put boldly—Loft airily—Approach warily.

THE MINISTRY OF ART AND RELIGION. A PARALLEL.

By E. K. Hough.

BEFORE the coming of Christ all religions were mainly taught for the benefit of the rich and powerful—the ruling classes of the world.

Before the advent of photography, art also was mainly practiced for the benefit of the rich, and its patrons were mainly sought among kings and princes, priests and lords, the rich and prosperous classes of mankind.

When Christ came He proclaimed the right of the poor to all the benefits of His gospel, and His teachings were largely addressed to the poorest and the lowest sons of earth, asserting their

equal right to salvation, elevation, and social development, with equal hope of happiness here and hereafter.

When photography came it made it possible, for the first time, that the poor and lowly could have the features of their loved ones depicted and preserved with as much truth and beauty as could the rich and proud.

One strong evidence of Christ's divine ministry was its absolute impartiality to all sorts and conditions of men, except the difference made by sin. Giving as much attention to, and placing as much value on, the soul of the poorest beggar as on that of the proudest prince. So one evidence of Divine purpose in photography is its absolute impartiality: incapable of flattering discrimination between a beggar and a king; depicting an empress queen with a plain, unconscious frankness that no human artist would ever dare, while it took seeming delight in touching the brown cheek of a Gipsy queen with rounded health and glowing beauty. God's pure sunlight will not lie to please even a king. All the falsehood and flattery in photography is made by men.

When John sent to ask for evidence that Christ was the true Messiah, Jesus answered: "Go and shew [tell] John those things ye do see and hear. The blind receive their sight, the lame walk, the lepers are cleansed, the deaf hear, the dead are raised up, and the poor have the gospel preached to them." Notice how the evidence gradually rises in importance to what is generally considered the highest effect of miraculous power, the raising of the dead. But, in the estimation of Christ himself, there is yet higher evidence to give in the crowning glory of His advent and the chief mission of His reign, that the poor shall have the Gospel preached to them.

Likewise we may confidently assert that the chief benefit of photography in art is its being the cause of bringing all forms of art, more especially portraiture into the homes of the lowly and the poor. Thanks to photography, there are now no homes so barren they cannot treasure the likeness of their loved and lost; no mother so poor that she cannot procure some representation of the dear but vanishing baby features ere they merge into childhood and youth.

Before the time of Christ there was no special ministry of any religion for the poor. The rites of nearly all religions were administered in costly temples by a proud and haughty priesthood, in full sympathy with the ruling powers, while the common people were neglected or ignored.

Before the advent of photography only royal and noble families had portraits of their ancestors to stimulate the pride and emulation of their descendants, while the common people were no more remembered than their dogs and horses, if indeed as much, for they were sometimes immortalized by the painter's art.



Photographed by F. L. FIEGER.
Engraved by
ELECTRO-LIGHT ENGRAVING CO.,
New York.

THE HEAD OF THE INLET.



In the ministry of religion there must be a mingling of the human with the divine.

There are bodies to be cared for as well as souls to save; ministers must live and study the economies of life as well as preach the truths of morality and religion.

Likewise the profession of photography has a moral quality as well as its business relations.

For as every sermon that tells of human dependence and Christian duty becomes a factor in the great problem of human progress and improvement, however slight its apparent immediate effect, so every picture of human features, treasured by some one with loving interest, adds something to the development of human affections, and the growth in sympathy and love of human hearts.

Those who attend most faithfully upon the ministry of religious truth are most likely to live pure and honest lives, although some may go wrong; so boys and men who go from home to encounter the temptations and evils of life are more likely to keep their fealty and honor if they carry with them the pictured faces of mothers, sisters, sweethearts, and wives, and keep them most in sight, for it must be a bold, bad man, or boy, who can carry such reminders of love and home into dens of iniquity and vice.

The student whose walls are adorned with the faces of his mother and sister is far less likely to admit evil companions and disgraceful orgies in his rooms.

No one can measure the amount of moral influence simple photographs may yield, and they should ever be made with as much care and conscious responsibility as a minister would preach a sermon.

But although Christ came to bring his Gospel to the poor, and enjoined upon his ministers everywhere to give the poor the first best benefit of all its truths, yet not all obey.

Many Christian ministers are eagerly seeking the pride of life, by competing for high salaries, in costly churches, before rich congregations, where the poor have no place and are not admitted.

So many photographers are striving eagerly for costly and elegant galleries, with a clientage of rich and fashionable patrons, among whom the poor are received with scant courtesy, always forgetting that the rule He gave, "as ye do to the least of these so do ye unto me," applies as well in photography as in any moral question of human conduct.

And as ministers of Christ who are willing to devote their lives to the service of the poor, amid plain surroundings, without elegance, and but a meagre living without luxury, are often looked upon with a kind of pitiful contempt by their more favored brethren; so photographers who cater to the wants of the poor at low prices, in accord with their means, although they may be doing

good work, are too often scorned and insulted by their photographic brethren, with epithets of "Cheap John," and like terms of shameful reproach.

Among the ministers of religion it is too often understood that no one will remain in an obscure position where he is simply doing good work for Christ, when he can have a position of honor and profit in the eyes of the world.

So, too, it is generally believed that no photographer will stay in an obscure position where he is simply doing good work for art by making good pictures at low prices for an intelligent but impoverished community, unless he lacks ability to rise above it.

No one seems to believe that either minister or photographer will subordinate their pride and ambition to the simple purpose of doing good to those who greatly need, yet can but poorly pay their service, from mere devotion to either religion or art, yet doubtless some do, and will.

And although there can be no equal comparison of value between the inestimable gift of Christ's Gospel and the art of photography in their benefits to mankind, yet they are both from the same divine hand of beneficent Providence, and are parallel in having their greatest benefit for the lowly and poor, and despite of all hindrance and obstruction from human ambition, pride and power, they will both go on doing good to the poor of earth until the end of time.

My parallel is not complete. It could be carried out much farther. But like the clue to a labyrinth, once given, those who desire can follow it to the end.

SUNSET PICTURES.

By Maximilian Toch.

WHEN the sun is sinking in a copper-colored sky or the light is dying in fitful streaks on a raw day, photographs can be taken which appeal to the artist. A watery foreground and a streaky sky are the requisites and the waning light is depicted in a style that is novel and admirable. The illustrations herewith, were taken after five o'clock last November on the Erie Canal and the exposures were all rapid. The development took place at first in weak developer and was finished in strong developer, as the illumination of the scene in all cases was what is termed hard, although it was a gray evening.

I started this style of work last year and have taken many pictures of twilight scenes, and since then I have rather lost in-



Photographed by MAXIMILIAN TOCH.
Engraved by
NATIONAL PHOTO-ENGRAVING CO.,
New York.



terest in my former work taken in bright sunlight. I enjoy the criticisms of those who cannot see beauty in a picture unless the sky is pure white or spotted here and there with clouds. I do not claim, by any means, that a good picture can be made with a blank sky, but what is more effective and striking in marsh scenery than a dull or streaked sky. The originals which were printed on Rough Velox are very pleasing.



PHOTOGRAPHY OF FLOWERS.

By Joseph F. Smith.

DURING the dull days of winter and early spring the camera enthusiast is sometimes at a loss for material upon which to exercise his favorite art.

The photography of flowers affords a fascinating field for indoor work, especially for those who are interested in still-life studies. With a very little trouble one can easily



Calla Lilies



Marguerite Daisies



Easter Lilies

arrange an ordinary room so as to make very good negatives of flowers or other still-life studies.

A large window as high as possible should be selected, preferably facing the north. A south window may, however, be used, especially on cloudy days when there is a broad, diffused light.

The flowers to be photographed should be placed in front of the side of the window farthest from the camera, three or four feet from the window, and the camera placed on the other side of the window from the flowers. To obtain top light and also to act as a reflector, a white sheet may be fastened to the top of the window and carried out into the room three or four feet beyond the flowers. The kind of background to be used should be determined by the color of the flowers, but as pink, white, or yellow flowers generally make the best photographs, a dark or black background should be selected. Two or three yards of dark brown or black velveteen will make a very cheap and serviceable background for most subjects.

In order to secure the definition and depth of focus desirable in a flower photograph, it will be necessary to use a small stop (F. 32 or F. 64), unless a very large, long-focus lens is used. This will



Trillium

prolong the exposure so that it will generally be found necessary to ex-



Roses



Narcissus

pose from one to fifteen or twenty minutes. Ample exposure should always be given. In photographing white flowers, hala-



Roses

tion will often assert itself to an alarming extent, and it may become necessary to use non-halation plates, though Cramer's slow isochromatic plate will generally be found most excellent for this purpose.

Development should always begin with a very weak developer, containing very little alkali. By diluting the developer and prolonging the time of development the halation may oftentimes be largely overcome, and the detail of the flower structure fully brought out.

In the printing, a process should be selected that will bring out delicate detail and give softness and a tone as nearly black and white as possible. Special portrait velox gives admirable results with most subjects if the negatives have snap and are full of detail.

Very much depends upon the color of the mount, and it should always be selected with reference to the character and tone of the print.

THE DETERMINATION OF THE FOCAL LENGTH IN PHOTOGRAMMETRY.

By Commandant V. Legros.

SOME critics, otherwise very kind, have reproached a certain photogrammetric apparatus bearing our name, and largely in use by surveyors, for lack of rigidity. This accusation is not deserved, for in our description and use of an elementary apparatus of photogrammetry, we make no pretention whatever to creating in every piece a new apparatus, but only to signalize the advantages of two modifications that any constructor can, at a cost of a few dollars, add to every photogrammetric apparatus of whatever style or make. This plan has to do with the use of a ground glass having a quadrilateral precision traced by the dividing machine, and a groove with perpendicular axis in the plan of the ground glass, by which one can make one of the systems of the uprights of the quadrilateral to be rigorously vertical.

We clearly describe that these modifications, worked systematically, according to the method outlined in the article, while permitting the suppression of the lens and of the vertical circle, assures to the apparatus so transformed a simplicity of manipulation, and, other things being equal, a character of scientific correction that is not to be found in the same degree in any photogrammetric apparatus at present in use.

It was found in the first apparatus established with these ideas that they were apparatus with bellows. This is only a question



Photographed by ZWEIFEL BROS.
Engraved by
TEACHENOR-BARTBERGER ENGRAVING CO.,
Kansas City, Mo.

A CONVENTION PRIZE WINNER.

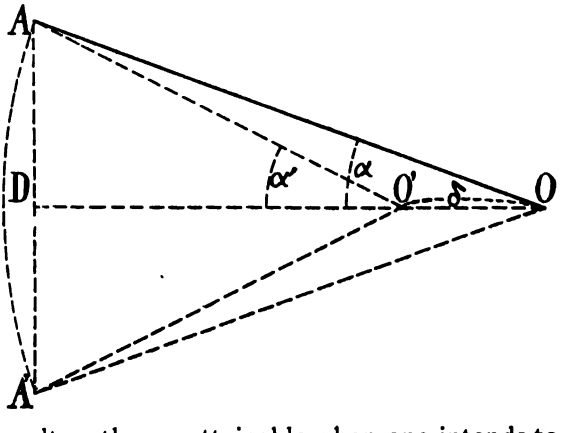
P. A. of A., 1903.

of economy, which has nothing to do with the principle of the method. It was due to the desire of reducing to the smallest compass, and least expense, an instrument which should combine all the indispensable resources to scientific observation, and for the usual practice of photography. For whoever is not constrained to look at it so closely, we do not contend at all the advantage for photometric operations of the use of a rigid camera. But that which we refuse absolutely to admit, is that one can present as a type of instrument of a high scientific character a photographic apparatus of an invariable fixed focus.

A scientific apparatus really worthy of that name should offer for the adjustment and rectification of the placing in position, the greatest possible facilities, at least in the measure presented in the use of an objective with heliodal mounting; and the focal length should then be determined at least at the beginning of each series of operations. This determination is in our method so simple that it is not worth the while to avoid. Better still, if looked for or not, it presents itself, so to say, fairly, almost at each observation.

This method consists in obtaining successively, by a displacement of the apparatus around its axis of rotation, the image of a distant point plainly distinct in coincidence with two verticals of the ground glass, symmetrical by relation to the central vertical. If 2l is the horizontal distance of the two extreme verticals, 2x the angle on which the apparatus has turned from one to the other, the focal distance, D, is found expressed by the formula $D = \frac{l}{\operatorname{tg} x'}$.

So that if this formula is to be strictly applicable, it is necessary that the vertical axis of rotation should pass by the nodal point of the objective; the focal distance being, therefore, always found carried to the back nodal point, as we have explained in our *Elements de Photogrammetrie.* In this case, it would not be necessary to look for a very distant point of mark. It is in every case a condition most delicate, and becomes altogether unattainable when one intends to reserve the right to use objectives of sensibly different focal lengths.



From the moment that one deviates from this condition, the method of determination brings an error. It is always easy to ascertain that this error is entirely negligible in practice, provided one has the care to select a marking point of sufficient distance.

The range resulting, by the evaluation of the angle X, from the rotation of the apparatus around point O, instead of from point O′, is the same as would be produced if, instead of looking twice successively at the same mark, A, before and after the rotation; one would look from each of the points, O, and O′, at the two marking points, A, and A′, situated at the same distance from the apparatus, symmetrically in relation to the direction OD of the axis of the objective; if one would measure the angles formed on each of these two sightings. Designating by δ the distance of the two points, O, and O′, one would have:

$$\text{tgx} = \frac{AD}{OD};\ \text{tgx}' = \frac{AD}{OD - \delta};\ \frac{\text{tgx}}{\text{tgx}'} = \frac{OD - \delta}{OD} = 1 - \frac{\delta}{OD}.$$

That is to say that the relative error in the evaluation of tgx, and consequently, in that of D, will be measured by the relation to the distance of the marking point of the interval comprised between the front nodal point and the axis of rotation. So, for an interval of ten centimetres between the front nodal point of the objective and the axis of rotation, with a mark situated at a kilometre, the relative error in the focal distance would be $\frac{0.10}{1.000}$ or $\frac{1}{10.000}$ of that distance; which passes all the exigencies of graphic constructions, as well as the limits of approximation generally realized in this kind of determination.

HAND CAMERAS.

By L. V. Kupper.

IN reality good *pictures* made with the hand camera are not very plentiful, and yet there are thousands of hand cameras in use. The results in the majority of cases are very poor indeed from an artistic standpoint, at least, if not from a technical.

It is so easy to press a button or a spring and let someone else do the rest; and even if one does not wish to develop and print, results should be more favorable; the blame is too often laid on the man who develops and finishes the prints. Now the manipulator of the camera is to blame, if any one. We might say that at what we aim a gun that will we also hit, the certainty of our aim tells the story. Now, the manufacturers of these hand cameras

have left nothing undone to make their instruments perfect, and if their instructions, which they give in the form of a booklet, to every purchaser, were more closely followed, a wonderful improvement would be seen in result. Above all, we try to get too much in our view; let us try and get as little as possible and see how that little will appear great; too much uninteresting foreground and too little or not the right kind of sky. Now green lawns and perfectly blue sky look very nice to the eye, but miserably flat in a photograph. Animals should be taken when they appear to enter our view and not when they leave it, for this makes them look as if they were chased away by some one unseen. Never attempt snapshots when the sun does not shine unless you have an extra rapid lens of the new type. Make time exposures on groups in the shade, resting the camera on something firm.





Learn to develop your own plates and films. The manufacturers furnish all the desired information regarding developing and fixing and washing—follow them closely. There is a sort of Ferris wheel, on the market, to fasten films onto when developing them; it is a great help, or you can make one yourself. Stop and think first before you start to do anything. Look at the common sense of the

thing: guard your plates and films from white light striking them in any way; remember that light makes your pictures; it will also unmake them, that is—spoil them by fogging.



If you do any printing keep your hands clean. Always trim your prints before mounting. There are some who think they make them look larger by not trimming—a great mistake.



Don't use too loud-colored cards; use plain gray or white—any of the delicate tints; embossed borders add sometimes to the pictures. Now I might go on but space forbids. I will close by saying look for the best things, find why they are best, and then only take a few of them at once. Always stop and think of the why and wherefore of the object to be accomplished, and you will have better success and less failures with almost any hand camera you may choose.

THE PROVING OF ZENKER'S THIN LEAVES IN THE COLOR PICTURES TAKEN AFTER LIPPMANN'S PROCESS.

By Dr. R. Neuhauss.

(*Translated by Henry Dietrich.*)

In his *Text-Book of Photochromy*,[1] Zenker ascribes the origin of colors in photographic views after the processes of Siebeck, Becquerel, Poitevin, and others, to the formation of very fine silver layers within the light sensitive substance. These layers (thin Zenker leaves) are developed (formed), according to Zenker, by standing light-waves, and have a mutual distance equal to one half of the wave-length of that light, which causes their origin.

That standing light-waves are actually produced as soon as, by reflection on a glossy surface, the emitted ray interferes with the reflected one, was proven by O. Wiener in his excellent work about standing light-waves.[2] With the aid of very ingenious methods he photographed standing light-waves, and proved their existence beyond a doubt. But that in color photography the colors are actually produced by standing light-waves, as asserted by Zenker, Wiener has not proven. To furnish this proof he would have been obliged to show directly in the color pictures the thin leaves produced by standing light-waves. This could be demonstrated only by diagonal cuts through colored views.

Whether Wiener at that time (1889) could have succeeded in furnishing direct proof of the thin leaves appears very questionable. The experiments would have been restricted to paper pictures, because it was two years later that Lippmann first published his color process built upon Zenker's theory, giving us therewith a more suitable material for such investigations: "transparent picture layers upon glass support." Still no attempt was subsequently made to continue Wiener's labors in the above sense and to terminate the dispute about the correctness of Zenker's theory. Among a few the opinion prevails that, with our present optical means, the direct proof of the existence of the thin leaves could not be furnished, because these hypothetical formations would be beyond the sphere of our visionary power. The erroneousness of this view was published by the writer[3] in 1894. One half of the wave-length of this spectral red comes to

[1] Berlin, 1868. Published by the writer. Page 77.

[2] *Annalen der Physik und Chemie.* New edition, Leipzig, vol. xi., 1890, p. 203.

[3] *Photographische Rundschau*, No. 12, page 360, 1894. *Eder's Year Book for Photography and Reproduction*, 1895, p. 188.

0.00038 mm. The thin leaves would therefore have this distance, which originate under the influence of red light. The distance of the diagonal stripes at amphipleura comes to only 0.00022 to 0.00025 mm. The stripe system in the diagonal cut of a Lippmann color picture must, therefore, be freed much easier than amphipleura pellucida.

On the occasion of very extensive investigations into Lippmann's color process in the summer of 1897,[1] the writer tried to prove the presence of the thin Zenker leaves. A glass plate was coated with collodion, and after drying, with silver-albumen. The exposure in the mercury holder took place with the aid of the spectograph, the development with pyro-ammonia-carbonate. The fixed and dried picture film, which showed magnificent spectral colors, could be easily stripped from the glass. The principal

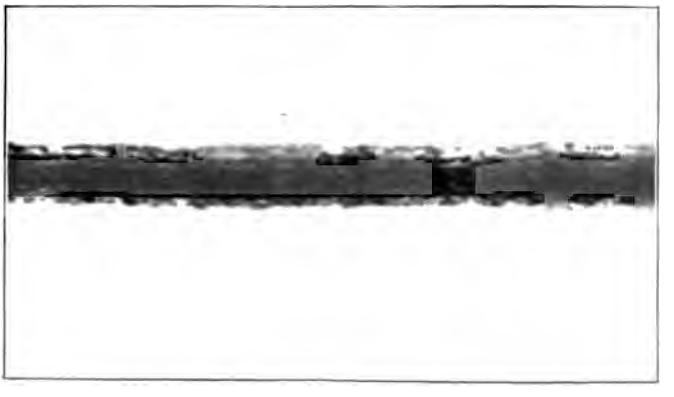


Photo by Dr. R. NEUHAUSS.

Diagonal cut through the developed film of a Lippmann plate $\frac{1}{4000}$.

thing was then to produce as fine as possible diagonal cuts in the red zone of the picture film, where the conditions for recognizing the thin leaves were the most favorable. The execution of the cuts requiring not only the finest microtomes, but also a skilled hand, the writer requested Dr. E. Flatan, from the first anatomical Institute in Berlin, to take charge of this work. This gentleman accepted in a most cordial way, and made about one hundred excellent cuts. For the purpose of executing the cut, the piece of the collodion-albumen film to be worked at was imbedded partly in paraffine, partly in celloidin. The paraffine bedding produced a much finer cut.

At amphipleura pellucida the refraction exponent of the bedding medium plays an important part. The higher the refraction exponent, the more easily will the dissolution proceed. The work

[1] *Photographische Rundschau*, 1897, Nos. 11 and 12; 1898, Nos. 1 to 4.

is easiest with preparations which lay in Realgar (refraction exponent, 2, 4). It was therefore considered probable that for imbedding of the cuts a medium of a similar high refraction exponent should be used. But the conditions with cuts of this kind are quite different than with Diatomeen. The fine leaves, consisting of metallic silver, are already imbedded in the albumen of the picture film. The refraction exponent of that substance, in which the albumen films float with the lamelles (leaves), cannot influence the dissolving capacity.

By reason of these considerations an imbedding medium was selected for the cuts, whose refraction exponent was as nearly related as possible to that of the object-carrier and the cover-glass, therefore Canada balsam was chosen. Some tests were also made with glycerine bedding, expecting that glycerine, by swelling of the albumen, would push the lamelles (leaves) further aside, and create particularly favorable preliminary conditions for the dissolution.

By dissolution from the stripe system it is desirable to know beforehand at what distance the stripes probably are separated. Selection of the objective, light source, and manner of lighting have to be governed by this. The cuts were executed in the red to red-yellow spectral zone, where half of the wave-lengths, measured in atmosphere, deviate between 0.00033 and 0.00038 mm. But the length of the light-waves is reversed proportionally to the refraction exponent of the medium, in which the light moves. The refraction exponent of the atmospherically dry bromide of silver-albumen for red light being approximately 1, 5, the lamelle (leaf) distance within the picture film would lie in our cuts between 0.00022 and 0.00025 mm. But the swelling of the preparation by the imbedding medium is to be considered. To determine the degree of swelling, the writer compared cuts, which had remained in paraffine bedding, with cuts in Canada balsam and in glycerine. Whether Canada balsam caused a swelling, could not be determined with certainty. With glycerine the swelling amounts to at least 30 per cent. With the glycerine preparations, reduction of the lamelle (leaf) distance in consequence of the higher refraction exponent of the albumen and increase of the lamelle distance in consequence of swelling balance each other.

The point was then to find out the most favorable conditions of lighting for dissolution. As known results, the smallest stripe distance (e) to be dissolved through a certain objective for central lighting as quotient of the wave-length (λ) through the numerical aperture (a), for oblique lighting, on the contrary, as quotient of half the wave-length through the aperture. At partly oblique lighting the conditions for dissolution are therefore the most favorable.

Accepting a lamelle (leaf) distance of 0.00038 mm. at oblique

lighting and use of the white daylight ($\lambda = 0.00055$ mm.) the stripe system should be dissolvable, if an objective with 0.72 num. ap. is employed ; for

$$e = \frac{\lambda}{2a}$$

$$a = \frac{0.00055}{2 \times 0.00038} = 0.72$$

The dissolution should therefore proceed with every good, strong drying system. An immersion with larger aperture than 1 would only then be necessary, if the lamelle (leaf) distance sinks below 0.00028 mm.

Practical experiments proved, however, that with possibly oblique lighting of our cut-preparations nothing can be attained. The thinnest paraffine cuts, having a thickness of 0.002 mm., only a confusion of shadows and indistinct outlines of the silver grains are seen at oblique lighting.

The use of oblique light was also prohibited, because diffraction edges, which may deceive every kind of striping, are hereby unavoidable. The *total* avoidance of diffraction edges, which under all circumstances we should strive against, can be attained only by central lighting under application of *possibly* broad light-cones.

For central lighting we have, as remarked above, the formula : $e = \frac{\lambda}{a}$

$$a = \frac{0.00055}{0.00038} = 1.45$$

To dissolve a preparation with stripe distance of 0.00038 mm. at white daylight and central lighting, an objective system of 1.45 num. aperture would therefore be required. Zeiss makes monobrome naphthaline immersions with 1.60 num. aperture, but they are not available for the foregoing investigations, because the imbedding medium must have a refraction index of at least 1.60, and that of the albumen reaches hardly 1.50. Besides the apochromatic oil-immersions have only 1.40 num. ap. With the same dissolution of the stripe systems in question, at central lighting and white daylight is therefore not at all possible. If we use blue light with wave-length 0.00045 mm. in place of the white daylight, the dissolution will succeed with an objective system of 1.18 num. aperture. The writer also applied sunlight by inserting an absorption cuvette with dark blue ammonia oxide of copper solution, and by central falling in of the light could bring to view the thin Zenker leaves. A still clearer idea than by ocular observation of the conditions, was given by the microphotographic views in four thousand times linear enlargement. The yellow-brown preparation, which absorbs much of the blue light, represents itself to the eye as too dark. At parti-



Photographed by WILKINSON,
Engraved by
ALBANY ENGRAVING CO.,
Albany, N. Y.

A CONVENTION PRIZE WINNER.

P. A. of A., 1898.



cularly favorable parts the stripage could also be recognized by ocular observation. But in the microphotogram, where the addition of the light impression plays a part, the lamelle-structure was much better visible (see figure, page 134).

The distances of the stripes, measured on the negative, agree exactly with the lamelle distances.

Thereby it was proven that Zenker's theory, regarding the formation of the colors in colored photographic views, is correct.[1]

These experiments taught also that by using light of a larger wave-length than $\lambda = 0.00045$ mm., in spite of centrally falling-in light, the dissolution of the stripe systems can be accomplished.

Here, however, the incompleteness of the hitherto applied oil-immersion made itself disturbingly observable; because the picture became subdued, when the lighting cone was sufficiently wide. The possibility of working with widest lighting cones depends upon the spheric and chromatic correction of the objective. By request of the writer, the firm of Zeiss (Jena) was so kind as to place at his disposal one of their excellent apochromates with 1.40 num. aperture for the continuation of his investigations. The results obtained herewith, are very remarkable. The stripe-systems could be dissolved with white and yellow light by centrally falling light, even when the stripe distance lay between 0.00022 and 0.00025 mm., as with the preparations imbedded in Canada balsam. Without questioning the correctness of the formula $e = \frac{\lambda}{a}$, a satisfactory explanation can be given for this. With the Zeiss objective the writer was enabled to fully use an aperture as large as 1.30.[2]

First after further increase of the width of the lighting-cone the picture became subdued. But at such considerable width of the lighting-cone very oblique bunches of light will act simultaneously with the central bunches of light, which exercise their action after the formula $e = \frac{\lambda}{2a}$. To apply the oblique light bunches without the central ones, is inadmissible, as seen above.

The Zeiss objective would of course have failed with such wide lighting-cones, had not another circumstance come to our aid. It might be tried to dissolve amphipleura pellucida with such a wide lighting-cone. Not only no cross stripage, but also the quarz dish will hardly be seen. The *structure picture* does not stand such with lighting-cones. It is different with the picture based upon absorption. The finest parts of colored bacteria appear best, if the full aperture (1.40) of the system is made use of. With our cuts we have in the yellow-brown color of the silver pre-

[1] That according to Wiener's investigations (Wiedmann's *Annals*, vol. lv., 1895, page 225) the formation of the color is sometimes based upon body-colors, as matter by itself.

[2] The front lens of the condenser and the lower side of the objective-carrier were of course connected by oil.

cipitate a medium between absorption and structure-picture. On account of the difference in the refraction exponent of the metallic silver and the imbedding albumen, the absorption picture does not come to full value. For this reason the preparations will not stand such a wide lighting-cone, as colored bacteria, but a considerably wider one than amphipleura pellucida.

By reason of the knowledge gained, the writer took a considerable number of views in sunlight, calcium light, and Auer-light with a Zeiss objective and yellow to yellow-green light filter, which all showed very clearly the lamelle formation. That with such wide lighting-cones a change with diffraction-edges is excluded, we need not mention particularly. At a certain width of the lighting-cone (which deviates with different cuts between 1.0 and 1.3 num. aperture), the dissolution of the stripe systems is always the most complete. By further enlargement of the aperture the picture becomes subdued by reducing the same (with the aid of the Iris diaphragm), the point will soon be reached, when every stripage disappears. At still further reduction of the aperture, stripage will appear again; but they are diffraction-edges, which by their degree of coarseness and by their appearance *outside* of the cut betray themselves as such.

Finally, I will point to some particulars which are met with in the diagonal cut. That half of the picture film, which is towards the collodion support and the glass, is always glass-clear; only that half, which during exposure was in contact with the mercury, shows silver-precipitate. The action of the rays which fall in and are reflected on the mercury-mirror was therefore not strong enough to change the picture film in its whole thickness. At those parts, which were next to the mercury, the silver precipitate is most opaque, clearing up gradually towards the middle of the picture film, to disappear completely in about the centre of the same. Curiously enough some single grains of silver will be found where the picture film rested upon the collodion support. Here, on the separating surface of both media a weak reflexion took place, but which was only able to change a few silver grains.

Within the zone of the silver precipitate there are visible all in all six to eight stripes (diagonal cuts of the thin Zenker leaves).

The views teach us also why the colors of Lippmann's pictures, when looked at, are less luminous from the glass side. Here those parts of the silver precipitate are in the direction of the eye, where the lamelle formation in consequence of the strongly reduced light action had no effect.

The lamelles do not show a straight, but a wave-like course. This is by reason of the surface of the picture film not being even, but wrinkled in consequence of the silver grain and shrinkage conditioned by drying out. The mercury adhering closely to the film, the thin leaves must show the same course as the surface.

It would be highly desirable to continue these investigations, and to extend to complementary color views. How the arrangement of the lamelles is formed at the latter, we cannot say with certainty at present. Different presumptions prevail, but only microtome and microscope will give us a final explanation.

Such investigations would certainly give us also explanation why Lippmann's process is accompanied with so much ill-success regarding complementary color views.

It would also be important to determine, how the lamelle formation proceeds with plates which were physically developed, and also show colors, even if they are false. As reduction of the not lighted silver parts does not take place, but accumulation of silver from the developer, lamelle formation cannot be explained.

PHOTO-MICROGRAPHY WITH DARK FIELD ILLUMINATION.

By W. H. Walmsley.

MOST of the work done with the microscope is upon transparent subjects, through which the illuminating pencil of light is thrown reflected from the mirror, and usually termed, transmitted light. Myriads of objects, naturally too dense to permit the passage of light through them, are rendered transparent by various methods of manipulation. Others again, being destitute of color, are made visible and their structures revealed by staining with various dyes. In all of these, the magnified image is seen precisely as the object would appear to the unaided eye if it were large enough to be thus shown. There is no change in the character of the light, as is made by use of the polariscope, the illumination being nowise different from that by which all objects are rendered visible to the unaided eye.

There are, however, numerous transparent substances, which if illuminated by rays of light passing obliquely through them at an angle preventing their direct entrance into the objective, appear as brilliantly illuminated *opaque* objects upon a black background. This method of lighting is technically known as Dark Field Illumination, and not only greatly increases the beauty of many specimens, but points of structure invisible or but imperfectly shown by transmitted light, are brought out with great clearness. Not all transparent subjects, however, are suited to this method of illumination, indeed the great majority of them are not amenable at all to its influences; but where they are so suited the results of its employment are exceedingly beautiful and valuable.

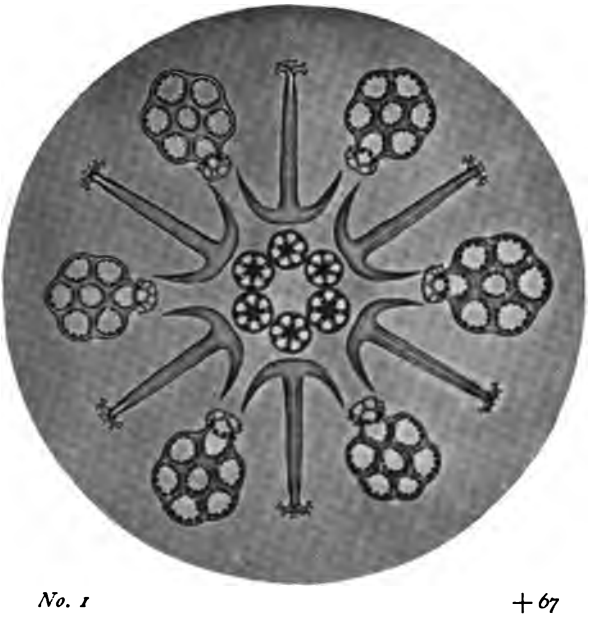
Dark field illumination may be produced by several methods, but the one generally employed, and altogether the most satisfactory, is that by the use of a parabola of glass fitted beneath the stage of the microscope, and with a blackened central stop which cuts out all direct rays of light reflected from the mirror below. With nothing upon the stage, the field of view through the eye-piece is absolutely dark; but the moment a suitable object is interposed, it will be brilliantly illuminated by the rays of light passing obliquely through it, and appear as an opaque upon a black field. Unfortunately but few of the most modern microscopes are furnished with parabolas, (or any other accessory apparatus for the matter of that), but less than a generation ago their use was universal with all microscopes. They can still be had however by all who desire them.

It is not a little singular in view of the very common employment of photography in the reproduction of microscopic objects, that little or no use has been made of dark field illumination therewith. But this seems to be the fact, at least in my own experience. I have no remembrance of ever having seen a photo-micrograph made by this mode of lighting, excepting the few of my own production; nor have I met with a line in print from any pen, bearing upon the subject. Yet it seems to be an important one, and the process most certainly is interesting and capable of producing very excellent and beautiful results. The belief that such is the case must be my excuse for this brief article and the accompanying illustrations.

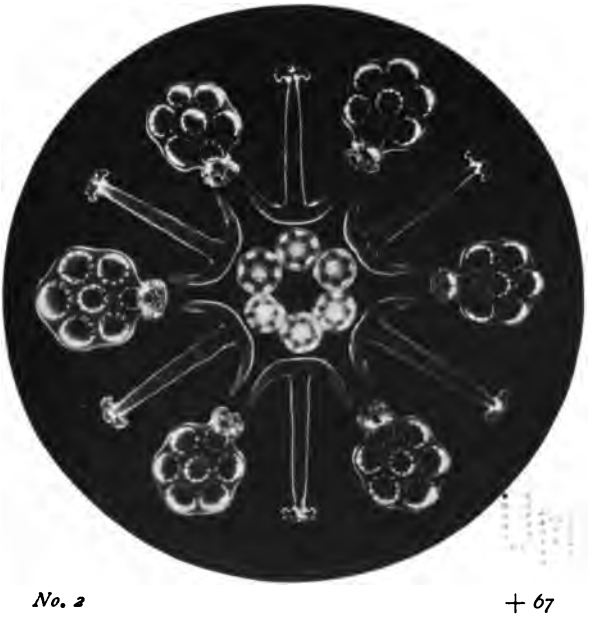
The photographic manipulations being in nowise different from those necessary for making other photo-micrographs, which have been so frequently described by other writers, as well as by myself, it would seem unnecessary to repeat them. Longer exposures than for transmitted light are necessary with given subjects and objectives. Negatives of good densities yield the best prints. I trust that some of my readers may feel inclined to try this fascinating work, and to make known the results of their labors.

Referring to the illustrations: Numbers 1 and 2 are from the same object, a group of anchors and plates from the outer integuments of marine worms belonging to the families of Synapta and Chirodota. The first was made under transmitted light; the second by dark field illumination. Numbers 3 and 4 in like manner are from a single subject—the transverse section of an Echinus spine, commonly known as a sea-urchin. These likewise were made under both methods of illumination, and all four are introduced as examples of the totally different appearance presented by an object under the two modes of lighting.

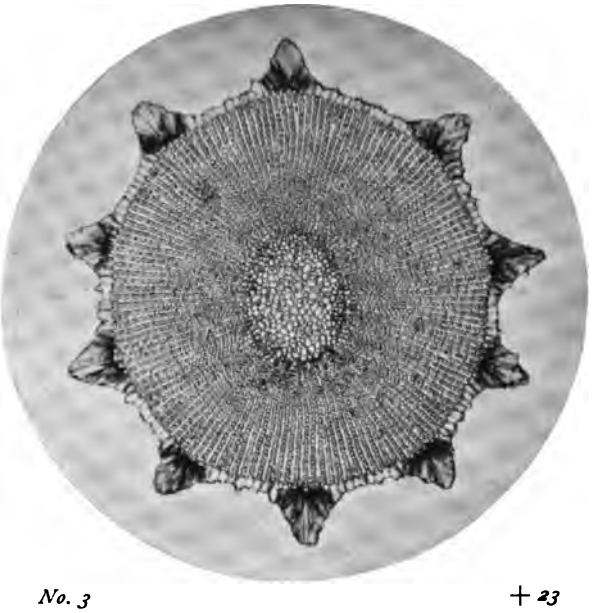
Number 5 shows the minute crystals of arsenious acid, as made by sublimation, which under transmitted light are almost invisible, being colorless and exceedingly hyaline. Dark field



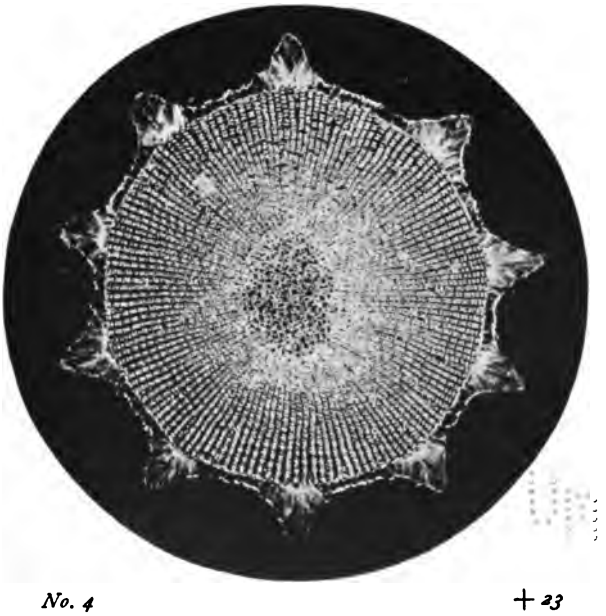
No. 1 + 67



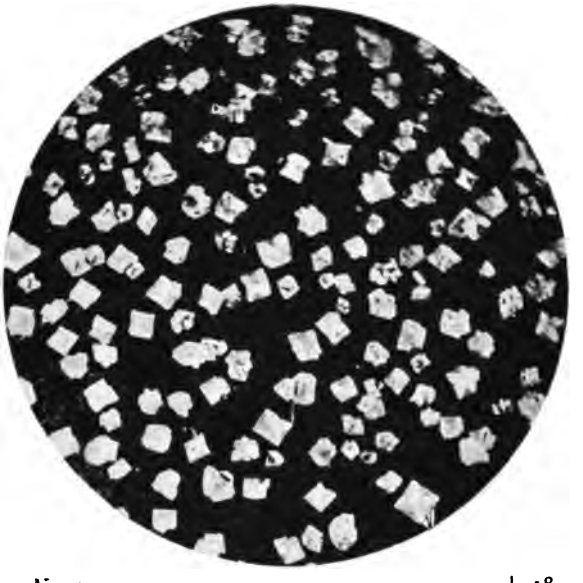
No. 2 + 67



No. 3 + 23



No. 4 + 23



No. 5 + *18*



No. 6 + *35*

illumination, however, reveals them as a profusion of sparkling gems reposing upon a jet-black bed. Number 6—platino-cyanide of magnesium—by transmitted light is a beautiful crystal, glowing with rich colors of red, yellow, and green, upon a light background. Dark field illumination presents upon a black background the same gorgeous hues somewhat intensified, which unfortunately cannot be reproduced in the photograph. The color values however are well shown.

PRINTING QUALITY OF NEGATIVES.

By W. Lansing.

IT is an every-day occurrence to meet with photographers who complain that there is something wrong with their prints. Their work lacks the snap and brilliancy that they notice in others. The posing and lighting may be perfectly satisfactory, and to all appearance the chemical effect in the negative all that could be wished for, but when the prints are finished they are flat, they have no depth of shadow, and no brilliancy in high-lights, in other words, they are all half-tones. Suggest to one of these photographers that possibly his negatives are a trifle weak, and he is quite liable to produce a number of negatives and holding them up to the light, one by one, point out that such is not the case. In fact, he "is making better negatives than he ever made before." If he is asked what kind of developer he is using he will want to know what difference that makes, "there are the results, what more can any one ask for?" At first glance this may look quite reasonable. Results are what we are all looking for, but appearances are sometimes deceiving, and many a negative, which if it represented in itself a finished piece of work would be considered perfect, is of very little use for making prints.

This article is not intended to boom or condemn any particular developing agent, but it is a fact that the majority of the photographers who are making flat work are using some one of the so-called patent developers, and are deceiving themselves as to the printing quality of their negatives. The new developers are considered a step in advance and it seems almost like going backwards to use pyro for developing, but although the new developers have many advantages, not one of them will make a better negative to-day than old pyro. Take two negatives of apparently the same strength, one developed with pyro, the other with one of the patent developers, and they will make entirely different prints. If the pyro negative is perfect, properly timed, and properly developed, the patent-developer negative will make a

print which will appear weak compared with the print from the pyro negative. This is almost entirely due to the absence of color in the patent-developer negative. Hold up the two negatives side by side and compare them, not for strength but for color. The pyro negative will appear a greenish black by the side of the pure gray-black of the patent-developer negative. The faint trace of color in the pyro negative holds back the printing in the high-lights until the shadows are strongly printed, while the absence of color in the other negative allows the light to penetrate the strongest high-lights and print them over before the shadows are printed deep enough. It is an easy matter to print flat pyro negatives, but they show at a glance that they are flat, and there is not much chance of being deceived as to the printing quality. What a patent developer lacks in color must be made up in strength. Patent developers have their advantages. They are less difficult of manipulation than pyro. They give greater latitude in time of exposure and do not stain the fingers. But they also have their disadvantages, the most prominent of which is the difficulty of judging of the printing quality of a negative until it is printed. It will be found that many of the leading photographers throughout the country are using pyro. Some of them have never quit it, while others have returned to the use of it after many experiments which have not been entirely satisfactory. This shows plainly that pyro is not a back number, and it will hold its own until something combining the good qualities of the old and new is discovered and placed on the market.

PHOTOGRAPHS OF FLOWERS.

By J. N. Gerard.

IT having been suggested that a few notes of my experiences of two seasons in the garden with a camera may be of some possible interest, they are offered with the premise that they are from the point of view of a fancier of flowers rather than that of a photographer. Floral and plant photography is interesting work and offers many special difficulties. One soon discovers that there is a multitude of subjects, which for various reasons are photographically impossible, and a great number which from peculiar combination of coloring or lack of marked specific distinctions are only fairly satisfactory subjects. Fortunately there remain many plants which are amenable to the medium, and with skill and patience not specially difficult to render satisfactorily. A flower fancier sees in every plant marked characteristics of form and coloring, and perhaps many of their

beauties are to him those subtle distinctions shown only in the light of that imagination by which we enjoy our special fancies. This combination is rather difficult to secure on a plate. To properly represent a flowering plant of much size, two plates are usually required, one of the entire plant in flower and another to represent the flower, as large as necessary to give its details, with at least a bit of the foliage. As flowering plants vary in stature from an inch or less to as many cubits, there is a considerable range of treatment necessary, but in a general way plants should be localized by screens (black ones being usually most satisfactory) and taken as slowly —with a small diaphragm—as the always prevailing winds will admit. Plants with spreading foliage must be taken with the light as horizontal as possible, otherwise the picture will show opaque shadows, which do not appear in nature, though not unknown in photographs. Greens in the garden are in an infinite variety of hues, ranging from nearly black to blue-green, and as they have a great variety of surface and texture, usually the variation of surface is a matter of veinings which appear as shadows. Foliage is, as a rule, a difficult subject to render. It is a good plan to expose carefully for the foliage and let the floral high-lights care for themselves. When one attempts to render flowers in detail, special difficulties arise;





for one not only desires to secure detail of form and structure ("specific characters" of the botanist), the texture if possible, but desires as well that the color-values shall not be too much out of harmony. The study of the spectrum, that photographer's spectre, is useful for the latter point, but a slight study of flowers will teach one that floral colors are mostly hues (mixtures), not tones of pure color. If we go into the garden for a few minutes and collect, say, all the white flowers, we shall find no two, from different species, of the same color. Even what we know as pure white flowers always have shadings, delicate very often, produced by foldings, ridges, etc. Then from the pure white will follow all hues as the white is mixed with yellow, red, blue, etc. Blue, it may be said here, refers to purple of a blue hue, as true blue flowers are so rare as scarcely to be considered. This is important to remember, as the mixture of red in these flowers is often sufficient to give the proper color-value without any special preparation. While we are in the garden we will notice that this white poppy which is now unfolding from its envelope, besides being covered with angular shadows, is very thin and translucent in petal



—a perfect antithesis to the camellia or tuberose, whose petals are thick and solid. These again reflect the light from their surface, while other flowers like the iris and some orchids, have their surface cells arranged like fine velvet, and the light is reflected from some depth. All these points, and more, will be borne in on the photographer who seriously tries to make floral pictures. In practice, flowers should be posed in reflected light; lens should be stopped well down, and exposure given as long as the subject will permit. One cannot give much time to a flower which, like a newly opened poppy, is constantly moving; but a camellia can be exposed before the slowest plate. As in all photography, lighting is the main thing, and if this is

deftly done, many aberrations of color-values may be avoided without the use of screens. It is a good practice to commence by making some standard plates for study. Select for this purpose flowers which, like the dahlia, have a wide range of coloring in hard masses. From these make two plates, one with, and the other without, color-screen, and develop them together. As an aid to memory, a sketch should be made of the flowers with description of coloring for reference. If these plates are studied while the flowers are available, one can discover the reason of any peculiar effects which appear on the plates. It will be often found that the lens has detected color, which the eye has failed to note, and it is the little points like this which will tend to prevent those "slaps in the face" which a carelessly studied picture will occasionally give one. Standard plates of foliage are no less useful; possibly more so, for unless one is extremely careful the flowers and foliage have a tendency to be very inharmonious. Color-screens with isochromatic plates are undoubtedly very useful, especially for a picture from many colors, but they are not an unmixed blessing in the middle of a spectrum, allowing the yellows and greens to become too dense, and usually out of harmony with the balance of the plate.

A METHOD OF DEVELOPING.

By Prof. H. R. Proctor, F.I.C.

THIS method depends on the fact that while a solution of quinol (hydroquinone) with an alkaline carbonate is incapable of satisfactorily developing a photographic plate unless very fully exposed, it can vigorously carry on the development or intensification once it has been started by another agent. Metol, on the other hand, is very powerful in bringing out detail, but on over-exposed plates tends to yield a flat image. Hence by using metol to bring out the required details, and quinol to give density, almost any degree of control can be obtained, and slight errors of exposure are of no consequence. I have developed two almost identical negatives, both of excellent quality, from plates which had been exposed successively on the same subject, but one eight times longer than the other! I do not lay much weight on formulæ, since different plates may require slightly different treatment, but I use the following solutions with good results on most makes I have tried.

The quinol solution contains 2 per cent. of quinol, 10 per cent. of sodium sulphite, and 1 per cent. of potassium bromide. The metol solution is 1.5 per cent., also with 10 per cent. of sodium

sulphite, and 0.5 per cent. of potassium bromide. The soda solution is 10 per cent. of ordinary sal-soda crystals, which we call in England "washing-soda." The development is begun in a mixture of equal volumes of quinol and soda solutions, in which one plate may be allowed to soak while another is being finished. If the image appears, the plate is over-exposed, and should be allowed to go on in the quinol solution, at least till some density is gained. If after, say, a minute, no image appears, the quinol is poured off, and the plate flooded with a mixture of equal volumes of metol and soda solutions, until a trace of image appears, say, just the sky-line, when the quinol is again substituted for the metol, and the plate allowed to gain density. If enough detail still refuses to come out, recourse is again had to the metol, and in obstinate cases of under-exposure the whole development is completed in the metol solution, which may usefully be diluted with water to avoid too great density in high lights. After a very slight rinse with water the developed plate may go direct to the "hypo," where it will not stain.

A good many plates may be developed successively in the same solutions, and a mixture of the two in equal parts forms an excellent developer for bromide papers. The solutions do not stain the fingers, but will stain clothes if allowed to dry on. I have never found any trouble with the metol as regards irritation of the skin, but prudence dictates that it should not be allowed to soak into it. No doubt slovenly workers had better substitute eikonogen or amidol, which would probably answer the same purpose.

BAYHAM ABBEY.

By Joseph Chamberlain.

I SUPPOSE there is hardly a visitor to Tunbridge-Wells that does not make a pilgrimage to the fine old ruins of Bayham Abbey, which the noble owner, the Marquis of Camden, kindly throws open two days a week, and to which char-a-bancs make a special point of conveying visitors, the drive being about six miles through romantic scenery; and there is no doubt a multitude of our American cousins who can testify to their grandeur, and who would be glad to visit them again.

This was one of the abbeys on a considerable scale belonging to the Premonstratensian canons, or White Canons, in consequence of their order wearing a white cassock with a rochet over it, a long,white cloak, and a white cap, who came to Beaulieu, or, as we now call it, Bells Yew Green, about the year 1200, from a monastery which had been formed first at Ottham, in Sussex,



Photographed by McPHERSON BROS.
Engraved by
THE BECK ENGRAVING CO.,
Philadelphia, Pa.

A CONVENTION PRIZE WINNER.
P. A. of A., 1898.

and then at Brockley, near London, by Ralph de Dene, whose daughter, Ela de Sackville, consented to the removal; and Robert de Thorneham granted all his land at Begcham, which name has been finally converted to Bayham, to build an abbey in honor of God and to St. Mary the Blessed Virgin. These possessions were by charter, granted by King John, and again by Edward III., and soon after they had settled themselves. Pope Gregory IX., in 1239, granted them a license to hold the advowson of St. Peter's Church, Pembury; this church was originally Norman, but now chiefly of the decorated and perpendicular styles; the walls are very thick, the outer buttresses being very massive, the coats of arms of the Colepepper, Woodgate, and Amherst families being carved thereon. The oak roof of the nave, which is quite plain, is claimed to be one of the best specimens in the country. The church did not actually come into their possession till the year 1278, when the then Bishop of Rochester issued his mandatory for the induction of the abbot and convent into the corporal possession of the church, with its appurtenances, according to the above-mentioned bull; and they appear to have had a great many benefactors whereby they became possessed of additional land and money. The manors of Hawkwell, near Pembury, and Matfield, in the parish of Brenchley, also came into their possession.

There is a manuscript in the library of Corpus Christi College, Cambridge, which contains an account of a visit by the abbot of Langdon, in 1315, and about this time it is stated there were churches belonging to the Abbey at West Greenwich, Crowder, Pembury, Hellingly, and Hailsham, the latter church being supplied with rushes from Bayham, which were used as a covering for the floor of the church. It was in 1524 that Cardinal Wolsey obtained sanction of Henry VIII. and the Pope to suppress some small convents to establish a college at Oxford, and one at Ipswich, when it was dismantled and its revenues, which amounted to £152 9*s.* 4½*d.*, appropriated; but when the Cardinal was disgraced, Bayham, with his other estates, was seized by the King. Queen Elizabeth granted it to Anthony Brown, Viscount Montague, and, after passing through several families, it was purchased by Chief-Justice Pratt, in 1714, in whose family it still remains, the present owner being John Charles Pratt, fourth Marquis of Camden, who has just been united to a daughter of Lord Henry Nevill, son of the Marquis of Abergavenny, of Eredge Castle, whose extensive lands join those of Bayham. The position of the ruins show that it must have been very secluded, the river Teise running past the ruins under the Murray Bridge, a modern structure, on the south side of which are the ruins of the gateway, and below this, facing the ornamental piece of water in the park, two modern walls have been built and two columns from the

chapter house have been used to form an open arcade, no doubt as a place of rest. On the bridge, facing the water, is seen a



The Murray Bridge and Ruins of the Gateway

shield, containing the arms of the family. A stone near the spot where the high altar stood gives the particulars of the foundation of the priory, and is as follows:

> ELA DE SACKVILLE DAVGHTER OF RALPHE DE DENE FOVNDED THIS PRIORIE IN HONOVR OF ST MARIE IN THE REIGN OF K. RICHARD YE FIRST: THE GROVND WAS GIVEN BYE SYR RICHARD DE THORNEHAM.
>
> THE PREMONSTRATENSIAN CANONS OF BROCKLEY, WITH THOSE OF BEAVLIEV WERE INCORPORATED AND PLACED HERE, AND THEIR CHARTERS WERE CONFIRMED BYE KYNG JOHN, K. HENRIE III. AND K. EDW II. IT WAS DISSOLVED IN THE REIGN OF K. HEN. VIII.

It is very certain that the Sackville family gave largely to the funds of the Abbey, and several members were buried there. From an abstract of the will of Sir Thomas Sackville, dated December 1, 1423, he desires "My body to be buried in the choir of the conventual church of Begcham. To the abbot and convent LXXX marks besides XX now in their hands

and owing to me, whereof I will that X marks be distributed to every canon of that house, and every priest of the same; XXs to every deacon and subdean, and Xs to every nun, on condition that they be every one enjoined in their celebration of obsequies, vigils, orations and other works of charity and contemplation to mention me and Margaret my wife, my father and mother, all my ancestors, benefactors and all the faithful deceased and I will that the residue of the said XXX marks be distributed by my executors to pay the debts of the said Abbey and Convent."



View in the Park, showing River Teise

The part of the building which attracts the attention of the visitor is the lofty south wall, which is on the left when entering the cloister garth, now a nicely mown piece of turf, the large buttresses having been kept in their place by the masonry that has been built up against them for the support of the nave wall, under which are some remains of the cloisters. The lower part of this wall is probably as old as the first foundations, and it is pierced at the east and west ends by doorways to the cloisters. The cloister garth is about ninety-four feet square. The refectory, which was lighted by lancets, took up all the south side of the enclosure and stood over cellars, which perhaps were the punishment cells, the staircase by which it was



The South Wall from Cloister Garth

entered being at the west end, and it was at this end that the guest-house was situated; this was about sixty feet long, but very little of it is left. At the east end of the refectory was the dormitory, running south, and this was over a calefactory; there was a slype between this and the chapter house, which was about forty-five feet long, and was originally divided into three divisions by a double line of three arches; one of these arcades still remains; adjoining this was a sacristry which led into the south transept, and here it will be noticed was a double ambry. Some wall arcading is to be seen, and also an arcaded recess near the entrance to the choir. Leading out from here were two chapels, one of which has a piscina. Passing into the body of the church we enter it just at the site of the rood screen, and, looking west, we see the length of the nave, which was about twenty-four feet wide; along each side there was a stone seat. On entering the choir, on the south side will be seen some remains of wall decoration, and also a corbel from which the triple shafting sprung to support the vaulting; the corbels were elaborately carved with foliage. The choir had aisles on both sides; in the first bay of the eastern half there is a piscina, and in the one nearest the northeast transept there is a recess for a tomb. The measurement from extreme east to west is 257 feet, the transept which crosses



The South Wall, showing the Cloister



The Chapter House

it is eighty-six feet long, the height from the ground to the plate beams of the roof is fifty feet. The tower was supported by highly ornate and elegantly clustered pillars, three of which are standing. There are two chapels on the east side of the northeast portion of the transept, and two in the southeast, each having a piscina, and in the southwest corner of the transept was a sacristry having two ambries. At the northeast and southeast extremities are the remains of turret staircases, leading probably to the rood loft, or round the interior of the building, as was the case in churches of that period. Everything eastward seems to belong to the early English and early decorated, and it is very likely that the building was not completed until early in the fourteenth century. The presbytery, which is aisleless, had a semi-hexagonal apse. The seat of the sedilia still remains on the south side, and near it a stone coffin and lid, with floriated cross. By careful exploration much more information might be gathered.



Archway of one of Chapels in South Transept



Pillars which supported Tower (looking East)

On the estate there is an old mansion called Bayhall, and from it there is reported to be a subterranean passage to the Abbey; this house has at the present time the evil reputation of being haunted. The earliest record of this old place and its possessors, the Colepeppers, seems to be when one Sir Thomas de Colepepper was one of the recognised justices of the great assize in the reign of King John, an office of no small

importance and trust, before the establishment of the conservators or justices of the peace. It is said that their desmesnes spread over the whole face of the country, but more especially in the western parts. Camden states that when Queen Elizabeth was passing through Kent in 1573, she honored the owner of Bedgebury, who was a Colepepper, with her presence, and at that time there were no less than twelve knights and baronets alive of the renowned house of Colepepper. The two principal branches were seated at Bayhall and at Aylesford: from the latter descended those of Oxenboath and of Preston, in Aylesford, baronets; from the former those of Bedgebury, which terminated in the Lords Colepepper, of Leeds Castle, and of Hollingbourne. One of the descendants who inherited Bayhall, named Sir Thomas, was custodian of Leeds Castle under Lord Baddlesmere, in the reign of King Edward II., and in the year 1322 he was executed for refusing Queen Isabel entrance into the castle, who, after her marshal had been refused, appeared in person at the castle gates and was denied by Sir Thomas himself. This so incensed the King that he laid siege to the castle and hanged the governor. Through this the manor was forfeited to the Crown, but soon afterwards restored to his son.



The Two Chapels in the N. E. Portion of the Transept



In the Park, River Teise

We find that in the thirty-ninth, fortieth, and forty-third years of King Edward III., John Colepepper kept his Shrievalty here.

He had married Elizabeth, daughter and co-heir of Sir John Hardreshull, of Warwickshire, by whom he had a son, Sir Thomas, who succeeded him in the manor and resided at Bayhall; he was sheriff in the seventeenth and eighteenth years of Richard II., from whom he obtained license to enclose fifty acres of land into a park at Pembury. He left three sons, the eldest of whom, Sir Thomas, seems to have alienated the manor in the reign of Henry VI. to Humphrey Stafford, Duke of Buckingham. After the death and execution of Humphrey and his son, the forfeited estates remained in the hands of the Crown till Edward VI., in the first year of his reign, granted it to William Parr, Marquis of Northampton, who conveyed it to Sir Anthony Brown, K.G., who was Master of the Horse to Henry VIII., and he the next year



Scotney Castle

alienated it to William Wyborne, whose descendant sold it, in the seventh year of King James I. to Robert Sackville, Earl of Dorset; his eldest son alienated the manor and seat belonging to it, to Richard Amherst, serjeant-at-law, who afterwards resided at Bayhall and died in 1632; it is probable that the east front, with the extended façade of Doric pilasters, is to be attributed to him, and it is by no means impossible that Inigo Jones may have prepared plans for rebuilding it when Richard Amherst purchased it and whose son rebuilt it after passing through the hands of the Selbys, Browns, and Streatfields, by whom it was sold to the Earl of Camden, whose descendants now possess it. But the ruin is not a patch upon the original mansion which years back flourished on this spot; one can discern the remains of the moat and terraces

which prove that the Manor House was the residence of some family of distinction. The walls are of immense thickness,—about three feet, six inches; this can be especially noticed where the remains of the old Colepepper building and tower at the southwest corner exist to attest its importance and magnificence when they possessed it, and the room at this corner has a good cornice running round the ceiling. There was also a fine old staircase, which has been removed, its heavy balusters reminding one of the old baronial mansions of the Norman times. The walls of the staircases and landings were painted in panels, which has often been taken for panel wainscoting; also there were carved wood mantelpieces, but these have now been removed.

By passing through the kitchen and down some stone stairs, one comes upon a spring of purest water in the centre of the brick floor, clear as crystal; and on the right of this apartment an archway is seen which is the entrance to the subterranean passage said to lead to the Abbey, but it is bricked up about six or eight feet in, which bars the passage. Some part of Lamberhurst was at one time under the control of those in power at the Abbey, but whether Scotney Castle was, is uncertain, but it was a castellated mansion of considerable extent, surrounded by a moat, and appears to have been occupied by a family of some consequence. Walter de Scotney, steward of the Earl of Gloucester, is supposed to have held it in 1258, and his descendants continued in possession until the time of Edward III. It was in the possession of the Darell family (whose ancestor was a follower of William the Conqueror) in the middle of the fifteenth century, with whom it remained till 1774. It was a square building, having round, machicolated towers at each corner, with intermediate buildings, one of which remains, that at the south entrance. The lantern on the top is evidently of modern date as compared with the original building. A portion of the house gate is still remaining and also part of an ancient mansion, the latter of which was designed by Inigo Jones.

THE PLATINUM PROCESS; ITS SIMPLICITY.

By J. Gaedicke.

(*Translated by Henry Dietrich.*)

THE platinum process still appears to a good many followers of the photographic art, like the pillars of Hercules to the navigators of ancient times, a terra incognita with the most terrible difficulties, although this erroneous idea is without the least foundation.

The platinum process is, in reality, one of the most simple of



Photographs by JOS. CHAMBERLAIN.

1. The New Mansion House, Bayham Abbey.
2. Bayhall, the Haunted House.
3. Back of Bayhall, showing entrance to cellar, containing spring and subterranean passage.
4. An old barn at Bayhall.

photographic printing processes, having by far the advantage over the ordinary silver processes and deserving to be better known. Any one who doubts this, should give it a short trial and he will be convinced. The process is so simple that we would recommend to the amateur to begin his first studies with it. The reason for my assertion is, that the difficult and frequently complicated toning process, as applied to silver prints, is not required; that the fixing can easily be guided by the eye, and that the time necessary for finishing the picture, after it has been taken from the printing-frame, will not amount to one fourth of that of a silver print. To these advantages of simplicity and saving of time is to be added the high quality of the pictures. In the first place the permanency, and then the noble tone with its deep black and neutral gray, producing a harmony of surfaces without any disturbing reflexes to the impression of the picture. The general introduction of the platinum picture is highly suitable to educate the public to a better taste, spoiled by the violet glossy silver-pictures.

But where there is light, there naturally must also be shadow; it is therefore not to be wondered at, that the platinum process has also its dark side. But we will show how certain defects can be removed in the most simple manner. One defect, or rather inconvenience, is, that the picture is only very faintly visible in the printing-frame. A little practice, however, is sufficient here to judge correctly about the proper printing degree, remembering that the fine flesh tones do not appear before development. The printing should, therefore, be stopped when the dark shadows in the flesh have become visible.

The second defect is, that the ready prepared paper will spoil in time, whereas, by self-preparation of the paper in such quantities only as may be required at the time, this difficulty is overcome. The process is very simple, if the durable arrowroot-paper, and the durable solutions required for its preparation, are bought from the dealer. Greater cheapness is also an advantage not to be overlooked.

The introduction of a solution for cold development, which is now applied almost exclusively, and for which the solutions can be found in market, is a progressive step in the platinum process.

The preparation is accomplished in the following way: A sheet of arrowroot-paper is fastened with tacks to a drawing-board, and is then coated with the preparation in artificial or subdued light. The several solutions are mixed shortly before use, in quantities corresponding to the size of the paper. The coating is done with a bristle brush, and to insure uniform surface the paper is afterwards smoothed with a badger blender. The paper is then dried at some distance from a flame, requiring generally only a few minutes. It is then put into a printing-frame, covering

it with waxed or parchment paper. If any prepared paper should be left over, it can be preserved in a tin box containing a small quantity of chloride of calcium.

A very good developer is a solution of oxalate of potassium, 1:3, to which is added one fifth of its volume of glycerine, to retard the development and avoid defects.

Diluted muriatic acid, 1:80, is used as fixing-bath, in which the picture is immersed in a porcelain tray just sufficiently deep to cover it. After some shaking, the fixing solution is poured out, and the operation is repeated until the solution remains clear, and does not show the slightest yellow coloration. This takes place generally after the fourth application. The print is then washed three to four times, and after passing through fresh water, is ready for mounting.

There is certainly no quicker process from the raw paper to the finished and mounted picture.

ALBUM SUGGESTIONS.

By Wilbur M. Stine.

IT is quite customary to preface an article of this character with a plea for the preservation of prints from all negatives in one's possession, and to recount the difficulties experienced in maintaining the complete set of prints, once they are made. As a satisfactory protection against one's friends, an album is generally recommended, but at the mention of an album one involuntarily thinks of somewhat heavy cardboard mounts, these leaves being either permanently bound between the covers or readily detachable.

After a time, when the number of negatives in possession passes into the hundreds, the collection of prints mounted on such heavy cardboard becomes very bulky, and the expense of their binding is a by no means inconsiderable item. Then too, in case several prints are mounted on the same leaf, a number of good prints must occasionally be sacrificed for one which has suffered some damage. Such method of binding lacks a flexibility in the arrangement of the collection especially if the precaution has not been taken to purchase several albums at a time, as otherwise the leaves may not fit covers that are later to be found in the market.

It is not an easy task to burnish such mounts, and burnished they must be, to make the leaves lie flat, which condition it is by no means certain they will maintain for any length of time, the mounts being very liable to draw and bend.

If one becomes accustomed to squeegeed prints and learns to prefer them to stiffly mounted ones, a very neat album can be gotten up which will be dainty and attractive and free from the objections noted. The prints are ferrotyped preferably after soaking for a time in water containing about 4% of glycerine. To prepare the leaves, obtain Whatman's drawing paper, with what is known as the rough surface. The paper is then torn into leaves of the desired size along a yardstick or other straight edge. A little practice will soon develop a proficiency for making the rough edges now so popular. If this paper is too expensive, cheaper substitutes can readily be obtained of a quality used for books and catalogues, with torn edges. For mounting 4 x 5 and 5 x 7 prints, the leaves may be torn to $5\frac{1}{2}$ x $8\frac{1}{2}$ inches. In mounting, the left-hand edge is coated with paste over a width of one-quarter inch or less. The print is thus practically free from the leaf and such mounts will not cockle.

One hundred such leaves will be sufficient to make a well-filled album. For a cover the University Doublet, size 3, may be used, or one improvised out of bristol-board. The leaves are then perforated and can at once be fastened in the cover with Dennison's paper fasteners. This particular size of leaf and cover is merely a suggested one,—the doublets can be purchased of almost any size and the method answers equally well for large prints. It is evident that the arrangement of the leaves can be varied at pleasure when so bound.

THE WATER FRONT OF NEW YORK CITY.

By C. M. Giles.

THE water front of any great seaport is sure to have many features of interest, photographically considered, and New York is, of course, no exception to the rule.

Speaking of the water front suggests the fact that the shore line of Greater New York is so extensive that it might be the subject of several articles. I will at present confine my attention to Manhattan Island.

Scattered along the west side of the city on the North River shore are the docks of the Transatlantic Liners which fly the American, French, and English flags. (The German lines have their docks at Hoboken.) Here, also, may be found most of the palatial Sound steamers, and a majority of the vessels plying to our Southern cities. The arrival and departure of the various vessels always furnish interesting groups and scenes, and nearly every prominent personage who visits or leaves this country may at one time or another be seen at one of these piers.



If you desire character studies, haunt the Battery and the near-by Barge office. Here, as they emerge, you will see processions and groups of newcomers from other shores, with most, if not all, of the quaintness of their native costumes and customs still apparent. Near here also is the Aquarium, formerly Castle Garden, the scene of Jenny Lind's great triumph at her first appearance in America. Here, also, is the home of the great fire-boat, the *New Yorker*.

Along South Street, on the East River, from Coenties Slip to the Brooklyn Bridge, usually gather the larger of the sailing ships; and many a bowsprit seems to be knocking for admission to the second or third story windows of the buildings across the street. Between them and the Barge Office, is usually quite a fleet of the humble but interesting "canalers," many of them visitors from the far West by way of the great lakes.



Wandering along South Street, sailors from every clime will be met, and the numerous second-hand stores hold many a relic from their voyages. Many of these shops are worth a careful scrutiny. Along this street the fruit steamers from the tropics are mostly found, and here the great clusters of green bananas and the fragrant pineapples are handled in immense numbers.



Photographs by C. M. GILES.

THE WATER FRONT OF NEW YORK.

About these busy streets picturesque groups abound. Along West Street, checkers seem to be the chief method of whiling away the time between jobs with the longshoreman, and bits of stone and brick for men, with chalked squares on a vacant door-sill for a board, furnish the usual paraphernalia of the game. The various ways of handling the freights are worthy a study, and often the freights themselves are objects of considerable interest. The products of every known part of the globe are here constantly passing and repassing. The great floating grain elevators that transfer the grain from the canal-boat to the ocean steamer; the powerful floating derricks; the various forms of lighters which transfer the freight from railway terminals to steamer piers; the dock building operations; all these, and many more, are the sights which the camera may make into permanent and attractive mementos of a visit to the river front.



ON WHAT DISTANCE SHOULD WE FOCUS SHARPLY?

By F. Paul Liesegang.

(*Translated by Henry Dietrich.*)

IF we expose with full or large opening, a sharp picture of the object focused is obtained on the ground glass, while nearer or more distant objects appear unsharp, and this unsharpness increases with the distance from the object focused upon. By using diaphragm openings of smaller size this unsharpness can be improved both ways, but we should know beforehand the distance on which we have to focus to obtain a general sharpness

over the whole picture. "Well," the amateur will say, "take the middle between foreground and background, so that the sharpness is uniformly distributed." But it is not so. By simple mathematical calculations quite a different result is obtained. I will give here no tedious, long formulas, but only the results of calculations, which may be of practical use. It does not apply, however, to so-called artistic views, requiring an unsharp background and particular sharpness for some parts of the picture, but, on the contrary, the supposition is that the background is to be just as sharp as the foreground.

BACKGROUND.

FOREGROUND. / EXPOSURE DISTANCE.	3	4	5	6	7	8	10	12	15	20	30	50	100	Infinite.
2	2.4	2.7	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.75	3.8	3.9	4
3		3.4	3.8	4	4.2	4.4	4.6	4.8	5	5.2	5.5	5.7	5.8	6
4			4.4	4.8	5.1	5.3	5.7	6	6.3	6.7	7.1	7.4	7.7	8
5				5.5	5.8	6.2	6.7	7.1	7.5	8	8.6	9.1	9.5	10
6					6.5	6.9	7.5	8	8.6	9.2	10	10.7	11.3	12
7						7.5	8.2	8.8	9.85	10.4	11.4	12.3	13.1	14
8							8.9	9.6	10.4	11.4	12.6	13.8	14.8	16
10								10.9	12	13.3	15	16.7	18.2	20
12									13.3	15	17.1	19.3	21.4	24
15										17.1	20	23.1	26.1	30
20											24	28.6	33.3	40

By determining the mathematically correct focal distances, one item is of great interest. This distance is independent of the focal distance of the objective and the opening of the diaphragm, it is completely given by the distance of the nearest foreground-point and the most distant point in the background. The above table, in which the focusing distance for different distances of foreground and background is recorded, can therefore, be used in every case. Suppose the farthest object-point is at a distance of 10 *m.*, while the distance of the nearest point is only 4 *m.*, then

it should be exposed on a distance of 5.7 *m.* according to the table. In this case we obtain at the distance of 4 *m.* the same sharpness and unsharpness respectively, as at the distance of 10 *m.* Towards the focal point at 5.7 *m.* the sharpness increases from both sides. By use of a smaller diaphragm-opening, the sharpness in foreground and background can be increased, but it is always the same at both distances by the focus, as given in the table. If we expose at another distance, as designated in the table, the status is disturbed, and no uniform distribution of the sharpness from foreground to background takes place. In such case a smaller diaphragm-opening should always be used than for ordinary exposure.

The table gives also a very simple rule, in case the background is very distant, as in landscapes. It should be focused at double the distance of the nearest point in the foreground. If the nearest point on the picture, for instance, is at a distance of 4 *m.*, the focus should be taken at a distance of 8 *m.* With reference to the table it may also be said: *The exposure-distance should never be more than double the distance from the nearest object-point;* or reversed, the exposure-distance should be less than double the distance of the nearest object-point, excepting only in cases where the background is extremely distant, in which event it may be the same.

NORTHUMBRIAN BORDERS.

By George Kilburn.

NOT among the least of the moral and social advantages resulting from the ever-increasing network of railways which has spread and is spreading over the length and breadth of the land, is the facility afforded to those who are shut up in cities and towns for a large percentage of their days, to visit the famous localities of their native land at a small cost of time and money. To be able to leave the smoke and din of the workshop, and take one's self away, if only for a short time, to scenes of rural freshness, beauty, and grandeur, to gratify the passionate love of nature which seems to be inherent in the English breast, fills the mind with happy thoughts, and brings back those images of beauty which may be in some instances a joy for after-life. With this view, few districts in England are more worthy of being visited by photographers than the Northumbrian borders. Having visited some of the places, I therefore can recommend any of our American cousins, or others who visit our shores, to pay a visit to this part of the British Isles, where one may revel in the variety of scenery, and where there is

hardly a castle, or hill, or valley, which is not illustrated by historic or romantic story, and which formed the great arena for the conflict between two gallant nations. Few places on the borders have a more prominent claim on the photographic tourist than Alnwick; not only from its historical importance and princely castle—the great border fortress and residence of the Percys, who were the source and centre of border story—but also from its favorable position, as a central point, to visit some of the most remarkable places in the country. The town of Alnwick is situated amidst beautiful and romantic scenery, and is thirty miles distant from Newcastle, and three hundred and thirteen by rail from London. On entering the town from the railway station, the first object to attract the eye of the visitor is a noble column, erected by the Percy tenantry, to commemorate the liberality of



Alnwick Castle from the River Side

the second duke during a period of great agricultural distress. This column is built on an eminence near the great south turnpike, is beautifully laid out with shrubbery, and is about 100 feet high, surmounted by a lion passant—the Percy crest—and at the base are four lions couchant. The castle is the pride and glory of Alnwick, and is believed to have been founded by the Romans, as many Roman coins have been found during recent excavations. The castle is now the very perfection of a baronial residence. It is situated on the bank of the river Aln, upon a commanding eminence which gradually rises from the river edge, and is not shrouded in sylvan gloom like many other lordly castles, but stands forth in its pride of place, conspicuous to every eye, glittering in every sunbeam, and open to every storm.

Among the many delightful walks and views around Alnwick, there are none that will repay a stranger's time like a visit to the Dairy Grounds. A pass, which is always to be obtained on application at the castle, admits the visitor by the lodge and dairy at the foot of Canongate. On arriving in the grounds the tourist walks along a beautiful gravel path, richly adorned with exquisite flowering shrubs of sweet fragrance. At every turn lovely and commanding views either of the castle, town, church, moor, or park and streams of water meet the eye, and cannot fail to create or heighten emotions of as pure delight as ever gladdened the heart or animated the soul from a contemplation of the charms of nature. In a right line from the great gate of the castle, and after passing a wide and spacious street and the churchyard of St. Michael's, a noble avenue of trees, called Rotten Row, leads to the park. On the left, just before reaching the lodge, is a monument bearing the following inscription: "William the Lion, King of Scotland, besieging Alnwick Castle, was here taken prisoner, MCLXXIV."



River and Cascade, Dairy Grounds



Ruins of Hulne Abbey

On entering the park by this lodge, the road winds down a steep bank to a sequestered valley, through which a clear brook runs and forms a pretty waterfall. Continuing the walk the ruins of Alnwick Abbey, standing in the midst of a lovely lawn, burst upon the view,

> " Where oft the soldier, weary of the round
> Of war and tumult, sought the humble cell."

Crossing the bridge, a footpath winds up an opposite hill, and on the more commanding points seats have been placed, where some of the finest views can be seen, while the tourist takes a rest. After walking some distance farther, the visitor comes to two roads which lead to Hulne Abbey, another of those ancient religious houses destroyed long years ago by our Protestant ancestors. A little distance farther brings the visitor to the " Ruins of Hulne Abbey." The Laureate asks:

> " Why don't these acred Sirs,
> Throw up their parks some dozen times a year
> And let the people breathe ? "

In this the Duke of Northumberland is no niggard. His castle, gardens, and parks are thrown open all summer through, to parties from all quarters. Not much of the old abbey is now left. The ancient entrance was through an embattled tower on the south side of the abbey. On the left side of this tower were a large hall and kitchen, to which a chapel was attached, and is now occupied by the gamekeeper. At the opposite side of this tower are the remains of the monks' kitchen, refectory, and chapel house. After leaving these ruins the visitor can return by either of several routes. One favorite route is by way of Bunker's Hill — so named from its resemblance to the famous battle-field near Boston, Massachusetts, by the second duke, who played a distinguished part in the war of American independence. There are many other picturesque localities which can be visited by those having plenty of time, viz.: Bambor's Castle, once a royal residence under the Saxon kings; a little to the eastward lie the Farne Islands, one of which, the Longstone, has been rendered memorable as the scene of Grace



Bambor's Castle

Darling's heroic adventure. Other striking objects in the immediate vicinity are, the harbor of Alnmouth, the noble keep of Warkworth Castle, and the Coquet Island with its lighthouse. I have not given any particulars of the town of Alnwick itself, but simply state that it is only small, yet it is pretty and clean, and very suitable for the photographic tourist, as it abounds with pictures. One incident which occurred during my short visit I should like to mention. Whilst I was photographing the ruins of Hulne Abbey a thunder-storm came on, and as I had to get back to the railway station to catch a train to Newcastle, the keeper, who is depicted standing against his house, very generously offered to convey



The Keeper's House, Hulne Abbey

me to town with his horse and trap. I gladly accepted his offer, and thus reached the town in better condition than I should otherwise have done, and repaid his kindness by sending him some copies of the house and ruins, which he had requested me to do. Owing to my visit being only a very short one, and the elements being against my doing much photographic work, I am unable to send you some of the prettiest views which can be obtained. I hope the readers will not judge the Northumbrian borders by the specimens sent herewith. I am indebted for much of the information here given to a hand-book published by the late William Ferguson, and sent me by the keeper.

SOME HINTS ON INTERIORS.

By H. M. Gassman.

THERE are three ways of lighting interiors for photographic purposes, viz.: daylight, artificial light, and a combination of both.

Daylight can be depended upon when the room has plenty of well-distributed light back of the camera, and when the color of the room is light enough to reflect considerable light to the farther end of the room. The objection to this light is that the end of the room admitting the light will be much brighter generally than the distant end.

The artificial light employed almost exclusively for photographic purposes is that produced by burning magnesium. This method of illumination is used when daylight is scarce, or absent entirely. The disadvantage of this method is that the resulting photograph is very apt to appear cold and harsh.

A combination of the two gives an equalization of the lights, and a warm, harmonious effect to the finished print. A little explanation of the method will make this apparent.

It usually happens that one or more windows are included in the view. The object then is to obtain the same light-effect from the window as from the interior itself. To prevent an overexposure of the window, close the shutters, or blinds, so that the light does not come in, and then make the exposure by flash or daylight as the case may require. Now open the shutters and make a short second exposure on the same plate to get the window and whatever may be visible through it. Care should be taken to keep the camera in the same position for the two exposures.

Another method of producing the same result is to take the picture after sunset, when the light is weak. In this case the window remains open as usual, and the two exposures are made in one. While the window is being exposed a flash lights up the interior. This method has been used most satisfactorily by the author, but it may be necessary for the novice to make several trials to get the fine adjustment of the relative exposure in both methods. By the first method the relative exposures are roughly as 15 to 1. But in this, and especially in the second method, there are so many conditions, such as the lens, working aperture, intensity of light, quantity of magnesium burned, etc., that it is necessary for each one to determine the exposures for himself by experimenting, keeping as many of the conditions constant as possible.

For the majority of his work the amateur can make a service-



Photographs by H. PICKERING.

POSSIBILITIES OF A HAND CAMERA.

able flash-lamp for about ten cents. Secure a common stove asbestos mat, to which a handle of stiff wire may be attached. Pour alcohol on the asbestos and light it. Shake *pure metallic magnesium* (powdered) into the alcohol flame by means of a common pepper-shaker, with holes made large enough for the powder to pass through readily. The quantity of powder required varies from one half to one teaspoonful when using an instantaneous aperture.

When making the flash, stand back of the lens and move the lamp up and down and from right to left, in order to soften the shadows. Great care should be taken before making the exposure to see that no picture-glass or mirrors will reflect the light into the camera.

A PHOTOGRAPHIC TRIP TO HOLLAND AND GERMANY, SHOWING THE POSSIBILITIES OF A HAND CAMERA.

By H. Pickering.

HAVING occasion a few seasons ago to take my daughter to Germany to finish her education, and being an ardent photographer, a hand camera was of course included in the outfit. Specimens of its work, with a short description of each point, I beg the readers to accept as my contribution to the International Annual. After a journey by rail, to London, across the city to the London, Chatham, and Dover Station, we soon were en route to Queenboro', where we embarked on one of the Dutch steamers for Flushing (pronounced as Flu-ling). After a six-hours sail we arrived and disembarked, then taking train for Antwerp, a town full of quaint, gabled houses, lines of quays, and of a very busy aspect generally. The first view of its renowned cathedral (accent on the first and last syllables) is obtained (No. 1) immediately you strike the principal street, showing a portion of Cleaver's of London Soap and Perfumery Establishment. A little farther, turning to the right, you come into a square, in one corner of which is the famed Quentin Matsy's Fountain (No. 2), the iron work of which is held to be some of the finest hand-wrought iron work in the world, and which gained for him the hand of his master's daughter. After a visit to the Museum, one sees in the distance, near the railway station, the statue of Liberty, erected in 1872 to commemorate the victory of the Franco-German War. Some idea of the size may be formed by comparing the figure of the man passing by (No. 3). From Antwerp a short railway journey brings us to Brussels, one picture only of which shows the Palais de Justice, comprising under one

roof law courts, police courts, council chamber, and public hall, an imposing structure (No. 4). Of course no one goes to Brussels without going to see the long-famed field of Waterloo. Taking train for Braine d'Allend, which is about two miles from Water-



7



11

loo, walking along from the station, the first object which strikes you is the immense "Mound of Waterloo" in the distance (No. 5), under which are buried the remains—placed there forty years ago—of forty thousand soldiers of all nationalities. The mound is four acres square, with the Belgian lion at the top. A short distance from this is the farm of Hongomount, the barn of which (No. 6)



12



13

is shown. The French and English took and retook this point of vantage three times: each time with severe loss on both sides, and when one side took it they tumbled the bodies of the slain into the famous well of Waterloo (No. 7) until, as history recites, the



Photographs by H. PICKERING.

POSSIBILITIES OF A HAND CAMERA.

" well o'erflowed with the blood of nations." Leaving Brussels again, we take the train for Bonn, full of quaint and imposing buildings, the Conservatoire de Musique (No. 8), the post-office, with the statue of Beethoven, who was born there (No. 9), some pictures of the locally famous pot market (No. 10). We take the steamer here and proceed up the famed Rhine, the first stopping-place being quite a characteristic riverside station, St. Goar (No. 11). St. Boppard (No. 12) shows a specimen of the churches and convents on the Rhine, with the vineyards in terraces above, and the drainage into the river (No. 13). The accompanying cut shows another church and castle with the ever-accompanying convent. Arriving at Coblentz, we stay the night and procure one snap, showing the imposing fortified bridge over the Moselle where it runs into the Rhine, with outlooks commanding both rivers (No. 14). The next pictures are in the city of Cologne (No. 15), showing its famous bridge of boats over the Rhine, composed



15



18

of boats innumerable, with heavy planks laid over them, and which allow of some being removed and floated down-stream to make a gap for vessels to pass through. The magnificent cathedral is shown in No. 16; in No. 17 the statue of Frederick Wilhelm III. in the principal square. From Cologne we proceed up the river to Bingen, where we disembark and take the train for Frankfort, the most magnificent station on the trip; from there to Homburg, where all the milk-hauling is done by dogs (No. 18), as in the next of Homberg (No. 19) shows how the postman does his round. From there by rail to Baden, where bullocks do all the pulling; a fuel cart (No. 20), which picture obtained for me the bronze medal in a local competition. Again the train, this time to Heidelberg, the most interesting because of its famed castle wrecked by Louis XIV. after a twenty-years siege (No. 21); the picture (No. 22) shows the terrace and balcony, with the fortress tower with walls twenty feet thick; and No. 23 shows

the entrance to the cellars where is the famed Tun of Heidelberg, an immense cask with a capacity of fifty thousand gallons.

Now, Mr. Editor, I have finished. I have tried to show how a snap-camera can prolong the beauties of a continental journey, and I hope it will be a stimulus to some of your readers to provide themselves with such an aid to pleasant memories.

COLLODION TRANSFER PAPER.

By A. C. Champagne.

WHO among us amateur photographers has not positives on glass for transparencies or lantern-slides? Which of us has not been deterred and annoyed by the difficulty of ascertaining the correct exposure, and as a consequence has spoiled many negatives without bringing them to a real success? How often have we, while looking at a print too deep in black, expressed our regret that the picture, very pretty in transparency, would not lend itself to being stripped so as to transfer it to another glass? Though this difficulty has existed many years, it can be overcome by the use of gelhaye paper. It has been known that the thin coating of collodion which constitutes the sensitive surface of this paper can be stripped, then transferred to a support conveniently prepared. This operation is unfortunately most delicate, regarding the porcelain coating isolating the collodion paper. This coating, as soon as the paper is stripped from it in small fragments with the fingers, is taken off with a sponge soaked in warm water. To accomplish this a certain dexterity is required to avoid tearing the collodion film.

This process, more curious than practical, was not always within everyone's reach, and required very light and careful manipulations.

To-day, however, thanks to the introduction of collodion transfer paper, there is not the slightest reason that can be given by the clumsiest person for not succeeding. In the following few words the essential elements of the process are given. Any support of glass, porcelain, wood, metal, etc., is covered with a coating of prepared gelatine or india-rubber varnish on which to transfer the picture. The transfer paper is formed of a very thin coating of sensitive collodion, the intermediary part is composed of soft gelatine. The manipulation is the same as that for papers of direct black prints. If a transparency is to be obtained, the paper is printed until the blacks are entirely metalized. The slides being seen by reflection, are only manipulated to the degree



Photographed by E. C. DINTURFF.
Engraved by
VAN NESS & MORSSNER,
New York.

A CONVENTION PRIZE WINNER.
P. A. of A., 1898.

required by the nature of the final support. After a few trials one can very promptly master the intensity to be given the pictures, in accordance with the object they are intended for. The prints as they are taken out of the positive printing-frames are treated by a toning-fixing bath, giving them varied tones as required; then, after being removed from the washing, are transferred to the support. Let them dry for twenty-four hours, then place them in warm water, when the paper first turns blue, then detaches itself. Now pass a soft brush over the collodion so as to remove the last particles of film that still adhere, then wash and dry them again. The operation is now ended. The most agreeable way, the easiest, and, we may add, the most useful application of this process, consists in using as transparent supports the negatives that are defective, of which, no doubt, we possess many that we consider of no value. All these glasses are covered with gelatine, which, once made clear, forms an excellent support. Then eliminate the bromide of the plates with hyposulphite of soda, destroy the image on the faulty negative with a concentrated reducer, then use one of the same negatives, treated in the same way, to fix the prints of the transfer paper. With this process there is no further groping in the dark as to the working of the positives, and no error in the development. It utilizes defective negatives and offers facility in its manipulations. The applications of it as regards newspapers are very numerous. It can be used to decorate a great many objects, such as palettes, cups, plates, screens, tambourines, etc. It can be made use of not only for transparencies, lantern-slides, and shades, but also to transfer stereoscopic slides to glass. The pictures on collodion are extremely fine, of great depth, very pretty when seen through the stereoscope; and their transfer does not present any difficulty, as they are separated and cut to their exact dimensions before transferring. In this process is found a new application in this branch of photography, recently made known to the public, which is the delight of a great many amateurs.

DEVELOPING UNDER DIFFICULTIES.

By Dwight L. Elmendorf.

IT has been said that the road to a certain place is paved with good intentions; that place must be Tampa; at least Tampa is a very good substitute for it.

Shortly after war was declared I packed my satchel, filled one trunk with plates, another with trays and chemicals, and camera in hand, started south on a fast train.

About four hours south of Savannah, Ga., my troubles began,

and that too without a moment's warning. The train, while running about 60 miles an hour, jumped the track and "took to the woods," there being plenty thereabouts. We did n't quite get there, but concluded to stop after demolishing the engine, the express- and baggage-cars, and overturning all the passenger coaches except the Pullman, which remained upright, although it stopped so suddenly that most of the occupants kept on travelling toward the forward end of the car, landing in a confused heap all together.



The Wreck

None of the passengers were seriously hurt, so we all turned our attention to the engineer, fireman, and express-agent, who were, I fear, fatally injured.

My next thought was my camera. Rushing into the Pullman I discovered the case wedged under a seat, and in a moment it was unpacked and found to be intact; so I made a few exposures on the wreck, but nearly dropped the camera when I thought of my plates in that wrecked baggage-car.

The trunks were in such a condition that I did not dare to examine them by daylight, so waited in fear and trembling till we arrived at Tampa, twelve hours late.

More than half of the plates were broken, and the developing outfit was completely destroyed, and there was no place in that lovely sand-bank, Tampa, where such things could be bought; nevertheless I took the steamer that night for Key West, hoping for better things, only to find a town with even a worse state of affairs: no room to be had, water sold by the gallon, and ice at a premium.

After a sad and unmentionable experience with the waves of the Florida straits on a tugboat, I returned to Key West to develop the few shots I had made at the blockading-fleet, and the shores of Cuba, after giving up the attempt to develop on board the boat, which persisted in assuming the most trying angles of inclination and otherwise.

There was no room to be had in Key West for love or money, much less a dark-room; but I discovered a deserted outhouse, and converted it into a dark oven by stuffing the cracks between the boards with yellow journals.



The Wreck

I purchased two gallons of water and ten pounds of ice for a dollar, and started into my dark oven. My hypo bath was my sponge-bag tacked to the side of the building. My developing-tray consisted of a tin cracker-box, in which was placed my rubber focussing-cloth, making a good water-tight tray.

The developer was mixed in a small pitcher which I borrowed; the candle in my red lamp was lighted, and I started in to develop; but soon had to disrobe on account of the temperature of the place.

The outlook was not very bright although it was very hot; in fact I don't remember any look at all, for the dark-room was so hot that the candle in the lamp collapsed and set fire to the board on which it was placed.

An immediate application of ice soon put a stop to that, and I put on my clothes and bought another candle. This time I put the candle on the ice and had no further trouble for three or four minutes, when suddenly—ice, candle, and lamp slid off and fell on the floor. As there was a plate developing, it had to be finished in the dark; after putting it in the hypo bag I then lighted the candle again. By this time my temperature was rising, and by the time I had developed twelve plates, the ice had all melted or had been used to extinguish fire, and I concluded that I had enjoyed quite enough of that dark-room; so I started for the hotel and borrowed a window-sill on which to place the developed plates.

The illustrations accompanying this article are from negatives made on this occasion, and under the conditions described.

My next experience in developing was at Tampa, a week later, where I began to photograph the army in camp.

Of all my photographic experiences, not one can equal this for the kindly interest and universal courtesy extended to me by the many officers of the regular army whom it was my privilege to meet.



A Home in Key West, Fla.

Securing a room with a bath attached, I thought my developing difficulties were at an end; but far from it. There was something in the water that caused a precipitate in the developer, so I had to resort to melted ice.

Then the water would not run when it was needed, and after stopping for half an hour it would begin again, but very warm, so that several plates dissolved before I could get them out.

After making the air in the vicinity a little warmer than usual by thinking over a few words suitable to the occasion, I concluded to cease developing until my return to a more congenial climate, in order to save the rest of the plates—if not my self-respect.

WARWICK CASTLE.

By Signor Aspa.

IT is far from my purpose to write a history of Warwick Castle, for that would include a great part of the history of England, which, needless to say, has already been written many times, by much better pens than mine. Nor shall I attempt a full description of the building—that alone would be a long business, and I doubt if much of it would interest any but archæologists. To describe the many artistic and architectural features that distinguish its splendid suites of rooms, its towers, and its chapel, even this only, would, I fear, take more space than I can reasonably expect to be awarded here. These lines are, therefore, intended merely to assist the passing photo-

grapher; the artist, architect, or archæologist will seek information elsewhere.

And as the average tourist or passing visitor is for the most



From an Old Water-Color Drawing

part anxious only to take away with him souvenirs of those strikingly picturesque objects which, besides being most desirable in themselves, are also the most easily and quickly to be gotten at, I will undertake to show him how, starting, say, from Leamington in good time, he may secure pictures of all that is best



Negative by R. Aspa. *The Castle Towers from Bridge End*

worth having in a single morning, his walk through the castle State-rooms included.

Warwick, no matter from which direction it is approached,

rarely fails to interest a stranger at once. From the fact that it stands upon a hill, many of its chief buildings show in an exceed-



Negative by R. Aspa. *Cæsar's Tower and the Mill from the Park*

ingly picturesque manner above each other, their arrangement varying, of course, to the view, according to the road by which the town is entered. The High Church dominates from the north and west, but from the Leamington roads —for there are two—and particularly from the more southerly, or Old Road, interest centres upon the castle, the majestic towers of which, topping the trees, invest the scene with a stern grandeur that impresses every person of taste. The best points, pictorially, of this great pile will, on further acquaintance, be found chiefly on this eastern side, and in the views here submitted this fact is well borne in mind. There is, however, one drawback: the trees that border the river have, in my recollection (more than half a century), increased to such an extent as to hide a considerable part of the castle's noble river



Negative by R. Aspa. *Cæsar's Tower and Cottages in Mill Street*

front. The first illustration on page 189 is from a water-color drawing in my possession, done from two points of view under the bridge, many years ago, and in which much more is shown than can



Negative by R. Aspa. *Warwick Castle from Tennis Grounds*

now be seen from any point so distant. It may be well to mention that some time after this picture was painted, a local professional photographer got an excellent negative from it, and, I have reason to believe, sold large numbers of half-plate prints,



Negative by R. Aspa. *Warwick Bridge*

the purchasers taking it as having been photographed from nature, and preferring it to the real thing, because it showed more. But the first actual photograph I can remember was done

by Russell Sedgfield, a friend of mine, about the year 1850, being taken from a meadow on the Leamington side of the bridge, of which the near, dark arch underside served as a frame to the dis-



Negative by R. Aspa. *Warwick Castle from the Riverside*

tant castle. This was a favorite device with artists in those days, Stansfield, Harding, and others having used it with good effect.

With experience I have learned that the river front of Warwick



Negative by R. Aspa. *Warwick Castle from near the Bridge*

Castle looks best with the sun upon it, and that one should be there by 8.30 or 9 o'clock. Admission to the interior is not to be had till 10, and, assuming the visitor to be driving, he may spend

an hour and a half outside very profitably thus: On nearing Warwick, let the driver be told to go first to Bridge End, a small



Negative by R. Aspa. *Guy's Tower from the East*



Negative by R. Aspa. *Western Side of Clock and Cæsar's Towers*

street of very old houses, that doubtless were in ancient times in



Negative by R. Aspa. *Clock and Cæsar's Towers*

a line with the old bridge. The print on page 189 is taken from the spot where the street terminates.

At about this spot there is a way through the Carpenter's Yard into the park from which the following views were obtained. But a "permit" from the castle office is required.



Negative by R. Aspa. *Guy's Tower from the Quadrangle*

In this view, taken some years ago, the magnificent cedar is seen which was blown down in a disastrous storm in 1895.

Returning now, from Bridge End towards the town, a halt will certainly be made upon the bridges, from which views may be taken very conveniently. I do not show one, as I prefer the views from the boating or tennis grounds below.

The Castle Gateway is to the right of a narrow street called Mill Street, at the bottom of which stands the Castle Mill. Visitors should descend this street at once, turning, about half-way down, through a large covered opening, into the pleasure grounds just named. These grounds are held by a private club, but, I am told, well-mannered strangers are always welcomed.

If the light is good a harvest of choice subjects will be found here. I submit only a few.

The illustration titled Cæsar's Tower and Cottages in Mill Street, and other combinations of tower and cottages, will be seen on the right before reaching the boathouse.



Negative by R. Aspa. *Chapel and other Buildings*

Warwick Castle from Tennis Grounds, is as full a view of the castle front as can be had.

Warwick Bridge from the water's edge—the "Banks of

Avon "—the bridge over which we have just passed, makes so pretty a picture that I cannot refrain from including it.

Following the river bank in the direction of the bridge, varied pictures are to be had at almost every step. Out of at least a dozen, Warwick Castle from the Riverside and Warwick Castle from near the Bridge are but average specimens.

Returning, now, *via* Mill Street, Cæsar's Tower will make a good subject for pictures, and from various points.



Negative by R. ASPA. *River Gateway*

On entering the castle grounds, the road from the gateway to the Clock Tower —cut in places through the rock—is very picturesque, but is perhaps darkened too much by overhanging foliage to yield good negatives.

Passing through the Clock Tower, which is provided with a portcullis, a suggestive requirement of mediæval times, we enter the Quadrangle and are at once bewildered by the amount of photographic possibilities visible around.



Negative by R. ASPA. *Castle. River Front*

Take Western Side of Clock and Cæsar's Towers for example. It was not possible to resist such capital light and shade. But in a few steps the view opened, and, behold, here is a view of the same objects, differently disposed but equally interesting. (Clock and Cæsar's Towers.)

Crossing the lawn and looking

back, Guy's Tower is seen to great advantage, one of the numerous peacocks which add color to the scene coming forward very obligingly to help the foreground.

The view of Chapel and other Buildings embraces the Chapel front, and, I believe, some of the domestic offices. The continuation to the left comprises the State and other apartments, and is probably twice as long, from which one may form some idea of the vast extent of the whole.



Negative by R. Aspa. *Bear's Tower from the Moat*

I am not sure that occasional visitors are allowed to see the river front. The doorway leading to it is shown (River Gateway)—a member of the Leamington Amateur Photographic Society very kindly helping its interest. The river front itself may, however, be seen also from a cottage garden at the bottom of Mill Street.

On the way from the Quadrangle to the Conservatory, where the famous Portland Vase is shown, one passes the original of my last illustration, the ivy-covered Bear's Tower, which is supposed to be older than either Guy's or Cæsar's.

Finally, a chance visitor may have the happiness, as I had, of seeing the gracious mistress of this grand pile; he may even have the good fortune, as I had, of getting the image of her lovely form in one of his pictures. He cannot wish for a more precious souvenir of the hour he passed there; but let him keep it to himself, as I shall do.

PROCESS WORK.

A NEW STUDIO FOR REPRODUCTIONS.

By A. C. Angerer.

(*Translated by Henry Dietrich.*)

IT would be a difficult matter nowadays to invent entirely new studio constructions, as every imaginable style has already been made use of, but as to particular appliances and arrangements, by means of which results are possible of great modification, it is different.

The title of this article does not therefore promise the former, but refers simply to the description of our latest studio, which we erected about a year ago.

The most remarkable feature of this studio is, that the operating-room, 11 meters wide by 9 meters deep (37 x 29½ feet), is jointly occupied by two photographic departments (each operator has 3 to 4 cameras at his disposal), whose dark rooms are to the right and left of the entrance. The operating-room in its entire length being not only covered with a glass roof of 99 square meters (107 square feet), furnishing the top light, but being also provided on both sides with ground-glass windows, 7 meters (23 feet) high, we obtain an extremely bright diffused daylight. The glass roof has an inclined position towards the north, and the brightness increases, when in the fore or afternoon the sun shines through one of the side-windows, making the electric light, which even during the summer months is in frequent use, quite unnecessary. In comparison with our older studios we require here one third less time of exposure. In defiance of all the brightness, there is an entire absence of the front light, which is so difficult to overcome when reproductions of oil paintings, pencil or india ink drawings are to be made, owing to the south wall, which is 8 meters (26¼ feet) high.

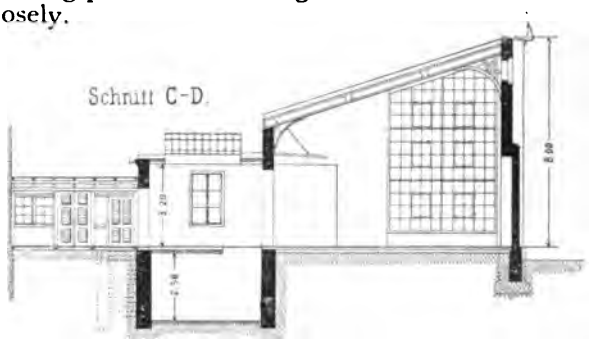
A further advantage of this operating-room is that dark corners will not be found. The light will therefore not be absorbed at any place, but will be reflected. This is the reason why the operating-room was provided with a top light.

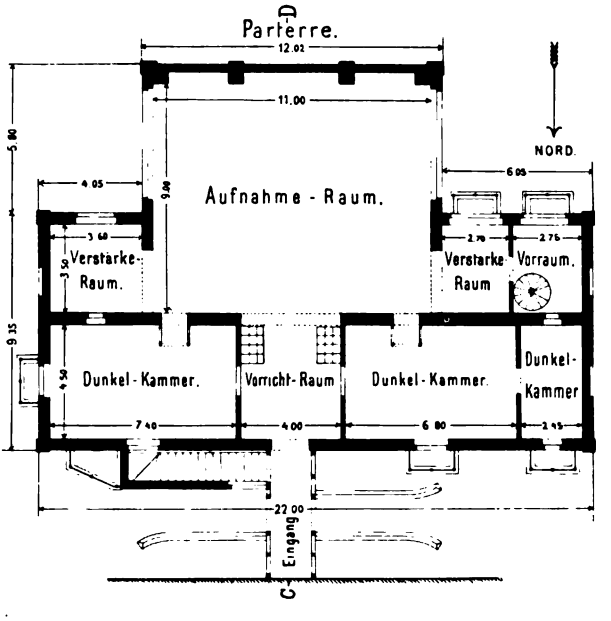
The length of the operating-room is such that all ordinary reduction can be executed without restrictions. For exceptional cases, like extra large objects, such as a carpet or oil painting, which are to be reduced to a very small size, it is constructed in such a way that a central pair of rails is laid to the end of the preparing-room, by means of which the originals to be copied are placed against the very uniformly lighted south wall, affording a distance of 13½ meters (44¼ feet) between camera and object.

The electric light consists of 2 pairs of incandescent lamps of

25 ampères and 120 volts and is arranged in such a way on movable rails that any desirable position of the lamps can be obtained.

The application of the so-called fly wings was dispensed with on account of the strong winds prevailing here, and the direct sunlight is shut off sufficiently from the original by rectangular curtains, running parallel with the glass roof, which can be drawn together closely.





Aufnahme-Raum = Operating-Room
Verstärke-Raum = Intensifying-Room
Vorraum = Ante-Room
Dunkel-Kammer = Dark Room
Vorricht-Raum = Preparing-Room
Eingang = Entrance

All the other sunlight falling upon the north wall, lights the space by reflection, which is materially increased by a coat of white oil paint, which covers the entire operating-room. To prevent the



HUSKING CORN.

Photographed by F. L. FIEGER
with DALLMEYER STIGMATIC LENS F-6.
Engraved by
WESTERN ENGRAVING CO.,
St. Louis, Mo.

accumulation of dust, the dark rooms have been painted in a similar way. The plant is heated by steam, and has ventilators and fans, set in motion by electric power.

Regarding the two dark rooms, it may be remarked that they are of a pretty good size and have extraordinarily large windows, 1.20 meters (nearly 4 feet) wide by 2 meters (6½ feet) high. Although the size of the windows is apparently of no advantage, all who work with large screen-plates that represent a considerable value will appreciate the importance of having the light in the whole studio of the same diffused character.

Besides both large dark rooms there is, to the right, a somewhat smaller one, intended for the work with orthochromatic plates. This arrangement is of great advantage, as one is not obliged to darken one of the rooms used for the wet process, and thus hold back the progress of regular work.

To the right and left from the operating-room, separated only by a small wall, are the rooms for intensifying the negatives. These rooms are also provided with large ground-glass windows.

All dark rooms to their entire length have a cellar underneath.

It might also be mentioned that all wood construction has been dispensed with for safety's sake, and that everything has been cemented. All further details can easily be recognized in the small cut.

This studio was built according to my own ideas, answers every purpose of a studio for reproduction, and has so far resulted to our entire satisfaction. I therefore deem it my duty to publish my experience.

THE THEORY OF HALF-TONE PRESS PRINTING.

By Romyn Hitchcock.

A PAPER upon the theory of half-tone printing was read by me before the American Association for the Advancement of Science at the Boston meeting, August, 1898. As the paper has not been otherwise published, a brief résumé of this theory, which is utterly at variance with the traditions and practice of printers, may be of interest to the readers of the International Annual.

A half-tone plate shows the picture clear and perfect. The delicate gradations of light are beautifully revealed. It is natural to suppose that, if the plate is inked and a sheet of paper uniformly pressed down upon it, the resulting print will be a perfect reproduction of the design. It would be so in fact; but because of uneven surfaces, both on the plate and on the printing-press, it is not possible to make perfect contact between the plate and the

paper without overlay or "make-ready," which is very troublesome and expensive. The sole object of overlaying should be to make such contact, but in practice it is applied with very different results. The reason for this is, that the accepted theory of printing engravings is based upon the assumption that gradations of tint require gradations of pressure in printing, the strongest pressure being necessary where the color is deepest.

Great pressure is necessary because of the unyielding nature of the opposing surfaces, which, by reason of their imperfections, can be brought into close contact only by the application of almost crushing force, to press the paper down upon the form. But it is wrong to conclude from this that solid blacks cannot be printed without such pressure. It is also wrong to assume, that a hard, unyielding backing is necessary for the finest printing, or that there must be variations of pressure to bring out the gradations of tint of an engraving.

The sole object of pressure in printing is to cause a perfect transfer of ink to the paper. The gradations of light and shade of a half-tone are determined by the size and shape of the dots and intervening light spaces. When the dots overlap completely we have solid blacks. Any single dot may be assumed to represent a unit area of printing surface. The pressure required to print that single dot is the maximum pressure required for the unit of printing area. The pressure necessary to print any given picture area is proportional to the number of units of printing area, or to the number of unit dots within it. Any pressure in excess of that involves a waste of power.

The facts may be stated in another way. All the dots of a half-tone print are equally black, whether isolated or aggregated in close groups of solid blacks. The gradations of tint are due to the number of dots per area and not to the pressure, or to the quantity of ink taken off by the paper.

The fundamental principle involved in this theory is uniformity of pressure on all parts of the plate. To apply the theory practically, it is necessary to devise some means whereby paper can be pressed into perfect contact with the printing surface with uniform pressure automatically distributed. This is accomplished by the use of a flexible fabric carrying vertically set, slightly bent, springy wires. The pressure is applied through the medium of these wires, which are very closely set, 800 to 900 points in a square inch, acting through a thin sheet of some flexible material such as hard rubber, for example, which is in turn covered by the ordinary tympan sheet. This fabric is the invention of Mr. M. L. Severy, and it is destined to effect radical changes in the methods of printing, and even in the construction of presses. A critical examination of the process by The Franklin Institute resulted in the award of the John Scott Legacy Medal to the inventor. It

will be seen that each of the wires acts by itself independently of its neighbors, and that the flexible tympan enables the wires to press the paper in conformity with all the irregularities of the printing surface. Because the wires are slightly bent they yield to pressure, but since the resistance to bending by pressure applied on the ends is greatest when the wires are nearest to straight, and decrease as the wires bend, the high parts of a plate are not subjected to greater pressure than the low parts. In no case is it possible to apply pressure approaching that used in printing by the ordinary process, for the reason that the wires would be crushed.

The new theory of printing may be thus compared with the views generally held by printers:—The old theory requires unequal distribution of pressure, the other uniformity. One demands heavy pressure for blacks, the other light pressure throughout. One makes contact between two hard, rigid surfaces; the other substitutes for one of these a flexible, yielding backing whereby the paper is made to conform to the inequalities of the printing surface.

The introduction of this process should be gratifying to artists and plate-makers, for it will remove the temptation which some printers seem unable to resist, to "improve" upon the work of the engraver by means of overlays which materially change the character of the design. The process reproduces in the utmost perfection whatever is on the plate, with lights and shadows in proper proportion, far more perfectly graded than is possible with any mechanical overlay.

It is perhaps advisable to state, for the information of those whose previous experience as printers makes them sceptical concerning such a radical departure from past methods as here indicated, that this theory has been tested and proved beyond dispute, by abundant demonstrations on both platen and cylinder presses. The practical result is, that half-tone printing of the finest quality is now being done commercially without any overlay whatever.

SCREENS FOR THREE-COLOR WORK.

By Max Levy.

I KNOW of no technical subject which excites more active interest among process workers at the present time than that relating to the proper form and character of screens for three-color work. I have recently given this matter careful attention, and the results of my observations were summed up in an article written for the *Process Year Book* for 1898, and I feel

that I can do no better than to reprint this article in full in the present ANNUAL:

"The theory upon which the half-tone process is based, as well as the general principles governing its practice, has been, for all practical purposes, completed with the publication of last year's ANNUAL, and the general principles deduced by Dr. Eder, Count Turati, Dr. Aarland, and other investigators have met with general acceptance and application to current practice. There remain, of course, and always will remain, a number of specific points relating chiefly to practice, that are worthy of discussion.

"The truly beautiful results that have been produced within the past year or so by means of the three-color process have given this branch of the work a material impulse, and this impulse has given rise to numerous queries regarding the proper character of screen for the work, its form and application.

"It was originally believed that the single-ruled screen was best adapted to the purpose of the three-color work, and its chief virtue consisted in the very considerable amount of variation from the normal that was permissible in the angle at which the various lines crossed one another, inasmuch as the whole series, when printed on one sheet of paper, resulted in but six angles of 60° each; its disadvantages, however, in imperfectly rendering delicate gradations and the middle tints, indicated from the very outset its final abandonment.

"With the cross-line screen applied to this purpose, the lines on the resulting impression form twelve angles of 60° each, and these angles have now become acute, so that even a slight variation of two or three degrees may introduce a 'pattern or moiré'; but other advantages growing from its use far more than offset the increased requirement of accuracy in the angle. This requirement of increased accuracy seems at first a much more serious matter to attain than it is in reality, its attainment requiring merely that the initial arrangements be adapted to the purpose in hand, and be of sufficient accuracy. The screen itself may be any good cross-line screen with lines and spaces of about uniform thickness; both rulings should have precisely the same spacing, and the lines cross each other at 90° within a very small fraction of error.

"It is generally desirable that one line of the screen should predominate in each block, and this result may be obtained in either of two ways: A, by means of a diaphragm aperture being made longer in the direction of one line than in that of the other, or, B, by ruling one line of the screen somewhat heavier than the other. While I believe that the latter method may possess some slight advantages over the other, the former in turn possesses over the latter the great advantage of flexibility and practically absolute control of the degree of variation.

"The question of the form to which the screen should be cut, seems to have given rise to a greater variety of opinion on the part of users than any other point involved. This diversity of opinion of course arises from the use of different mechanical means of obtaining the various angles; if we take an ordinary list size screen, say 10 x 12 inches, we will be able, of course, to make a plate such as the screen was intended for, up to the full list size of the screen. When we attempt to make the two other plates, we find it necessary that the screen should be used at an angle of 30° both right and left; we find that our screen will now make, at this angle, but little over 7 x 9 inches. If the screen had been 12 inches square, we should have been able to make a plate about 8 x 10 inches.

"Various expedients have been resorted to, to overcome this decrease in the capacity of the screen; one of the most common is to have two screens of the maximum size desired; one may be ruled with the lines parallel with the two sides, in which case the complementary screen will be ruled with the lines at 60° and 120° to the sides, or the one may be ruled diagonally at 45° to the sides, and its complementary at 75° and 105°.

"The diagrams will make the relations and conditions clear. Fig. 1 shows the symmetrical plate ruled at 45° to the sides and the complementary plate is shown in lighter lines, and the same screen in its reversed position is indicated by dotted lines. Fig. 2 shows the same things with the symmetrical plate ruled parallel with the sides.

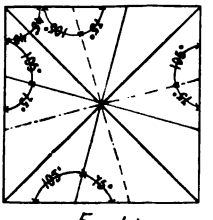


Fig. 1.

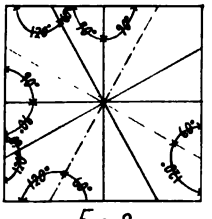


Fig 2

"In such a set of screens the plate ruled symmetrically to the two sides (either vertically and horizontally, or diagonally), is used for one of the three blocks, while the screen which is ruled unsymmetrically to the sides is used for the remaining two, and as it requires to be reversed for the two different plates, it is advisable that the glass on both sides should be, as nearly as possible, of uniform thickness.

"Another method of using the screen in this work is to have one screen and have it made either square, round, or hexagonal in form, and rotated in the holder for the successive plates. The method which I consider simplest is to have one screen of ample capacity, and have this screen remain stationary in the holder during the entire operation, with a separate arrangement for rotating the original to stops. In connection with such an arrangement it is of course desirable that the plate-holder shall be fitted to receive the plates at the various angles, in order to save the handling of large plates, and the waste of material which would be in-

volved if the plates could not be used in the same position that the subject occupies on the ground glass.

"On the whole, however, I believe that the bulk of advantage is rather in favor of the use of two screens ruled as above indicated. The initial cost, as compared to the single square or round screen, varies considerably according to the size; in the largest sizes made, the two screens together will cost a little more than a square or round screen of the same capacity, and from these sizes down, the difference is increasingly in favor of the two screens as against the one until the 7 x 9 inch size is reached, where the square or round screen costs about 50 per cent. more than the other two screens together.

"Another element of economy in the use of two screens as compared to one is in the smaller size of all the apparatus employed, and the greater ease in handling the smaller screen.

"In a very large number of cases the initial cost to a concern already engaged in half-tone work is very much in favor of the use of the two screens instead of one, for the reason that one of the screens already in use for current work may be employed to complement an additional screen ruled at a suitable angle."

HOW TO USE A NEGATIVE FILM WITHOUT A SUPPORT.

By H. D. Farquhar.

TO produce an article nowadays on photo-engraving that is new and has not been rehashed by the journals from one end of the land to the other, is a task which I will not attempt at present; but will content myself with something that was "old enough to vote" at the last Presidential election, but which, strange to say, not one out of ten process engravers ever worked with success and the remaining nine never heard of.

To be sure of success with the process, good material is essential, as may be said of all preparations used throughout the photographic process.

To buy a chemical a few cents a pound cheaper than that offered by a dealer who is reliable, and to get ten cents' worth of adulteration and a dollar's worth of trouble, does not pay when you are only getting twenty cents per square inch for your half-tone work. More especially is this so in view of the fact that you should get twenty-five cents per inch, and can do so if you use reliable goods.

For this operation the negative is made and dried in the usual

manner, and is then coated with a solution of *good* virgin rubber dissolved in naphtha. I would advise the use of naphtha in preference to benzole, as the latter is liable to dry mottled, which has a bad effect. The solution should be somewhat thicker than that usually used. After it has stood long enough to allow all particles to settle, decant the clean solution into another bottle, and with this flow your plate, place in a rack to dry, allowing the drippings from the plate to run into a trough or receptacle placed under the rack. The rubber thus collected can afterwards be redissolved and used again. When dry, the plate is given a coat of plain collodion.

In the preparation of the collodion some care must be used in the selection of the gun-cotton; the longer the fibre the better it will be for this purpose, as it makes a much stronger film than the shorter-fibre cotton and thus better adapted to stripping.

Another requisite out of the ordinary is a stone slab large enough to accommodate the size and number of plates you wish to coat; this slab must be placed on a table and made level.

The rubber-coated negative is now coated with the stripping collodion mentioned, by pouring it on the plate, forming a puddle which will cover the picture well; now place the negative on the level slab, where it remains until set or dry.

If the job you are working is in a hurry, the drying can be considerably hastened by setting fire to the film, which will not at all injuriously affect it if care is taken not to let the flame continue too long at a time; the alcohol and ether only burn, if allowed to act for short intervals, while if not blown out soon enough, the cotton film will catch on fire and be liable to destroy the negative.

After the film has become dry, it is cut around the edges and placed in water for a few minutes; if the glass was perfectly clean the film can easily be removed, and should be placed on clean blotting or unsized paper free from lint. When all the films are thus placed, another paper is laid over them and pressed down by placing a weight, such as a level board or book, on top; this operation dries the films, and has a tendency to make them lie flat. If they do not, however, more castor oil should be added to the stripping collodion.

While the films have been drying, the zinc should be sensitized and made ready to receive them, by sensitizing and drying in the usual manner. Next, when the plate has become partly cooled, proceed to coat the plate over the sensitized surface with castor oil. Pour a few drops of oil on a glass plate and with a small rubber or composition roller distribute it thoroughly, and with care roll over the prepared zinc plate.

To make a nice job, too much oil should not be used; all that is required being a very thin layer.

The films are now placed on the plate in a position that will consume as little space as possible and rubbed down with the fingers.

By starting on one edge, holding up from the plate the opposite edge, gradually work down until the film lies flat, care being taken that no air bubbles form between the film and plate.

Stretching a soft cloth over the end of the fingers, dampening it with turpentine, and rubbing over the film will cause it to lie better, especially if the film is extra heavy and has a tendency to curl at the edge.

When all the films are properly placed, the plate is ready to be exposed to light. When the print is made, carefully strip the films from the plate, and place them between leaves of a book to preserve them, and they can be used over and over again. The oil is now cleaned from the plate by sprinkling with good turpentine, and wiping with a soft cloth.

The plate is next rolled up with ink and developed in the usual manner; it is then ready to be etched.

The process needs no printing frame; the contact obtained is in every respect as good as can be obtained with a frame, and admits of doing just as fine a grade of work.

Large plates can be printed by this method that would be almost impossible to make in a frame; in fact, there is no limit in size that can be successfully worked. Negatives can also be matched easier than by stripping them on glass.

PROCESS FOR OBTAINING LINE SCREENS FOR PHOTOTYPOGRAPHY.

By Charles Gravier.

ONE of our illustrious colleagues having lately indicated the use of perforated bristol-board to make line screens used by photo-engravers to divide the continuous surface of a photographic image into points or lines (a necessary condition to give typographic prints the sensation of white, which expresses the half-tones), this use having been indicated by us several times since 1892 in different sessions or meetings, we believe it useful to bring to mind the principal methods proposed for the making of this screen.

A current process consists in tracing on stone or copper a network of parallel lines inclined at 45°, and to print on the lithographic press on coated and gummed paper, proofs that are powdered, the surface being flowed with a coat of collodion at 2%, and transferred to a talcqued glass. The paper is then detached



Photographed by R. D. BEEM.
Engraved by
COLORITYPE CO.,
New York, N. Y.

A CONVENTION PRIZE WINNER.

P. A. of A., 1898.

in the same tray, filled with water which has been used for the purpose of transferring to the glass film, and when dry is detached from the glass, after stengthening it either with a coat of gelatine or a sheet of gelatine.

This preliminary engraving is continuous, and it is difficult to obtain regular lines as regards width.

In point of economy, one prefers to photograph the ruled cross-lined papers used by the *genre* designers, or the cross-lined paper of the geometrician; the latter, however, have the defect of having the lines finer than the intervals separating them, and the typographic results are defective; they also reject the transparencies of manuscript.

The use of white muslin, or even black as it is more opaque, giving the effect of a network of fine metallic threads, presents the same disadvantages as the geometrician's paper.

The use of metal sheets or of perforated cardboard is economical, but up to date it has not been utilized in practice. It is faulty through the great spaces between its points and their thickness. It is not good in practice to go to a lower diameter than o m/m 4, the space between the points remains in actual and current practice at o m/m 6; but one could with Bristol-board obtain by holes arranged in quincuncial form, the same as is done for the thin metal sheets, a much closer disposition.

We believe that the competition which exists between French and German experimenters, will be able to procure it for us. We have indicated that for posters, one could obtain satisfactory results with these cards. In America and in Germany, they manufacture industrial screens by photographing the lines or points; the screens of Wolf, of Dayton, Ohio, and those of Gaillard, of Berlin, are thus made.

The last has among others a disposition which caused us a little searching to ascertain its manner of production, but we believe we have found it, by photographing these cross-lined materials in black and white, as in this manner we have obtained one identical with the last.

This constitutes an easy way to obtain a cross-lined network, and by stretching the material a little, one obtains a different cross line, which can be utilized to avoid the watering of the polychrome prints.

Some persons among those who regret the attempts made with tool engraving by photography, reject the use of the screen, lined or pointed, charging it with not showing the image except through a sort of sieve, the regularity of which removes entirely all artistic sentiment.

These persons do not, however, dare to insist when we present them with proofs from American houses, in which this defect is not visible. It is evident that in France they have not as yet

been able to achieve results as perfect in an industrial way as are there obtained.

One can obtain screens in which the pointing is made irregular, by projecting on a surface, (glass, metal or paper,) covered with an insolating body, such as a strong and transparent coat, (gum, varnish, gelatine, etc.,) a fine powder either with a sieve, a pulverizer, or by means of the air brush.

One can equally ink a rough surface, (rough ground glass, sheet of glass paper, etc.,) and by means of gummed gelatine paper, transfer the print on transparent gelatine paper, or else print lightly on the gelatine directly; it is necessary to powder the print to obtain greater opacity.

The screens covered with a grain have not up to the present time been able to give as perfect results as the line, cross-line, or pointed screens.

The Levy screens rank high, and are made with the greatest care; the work consists in tracing in a parallel way on a glass very fine lines, spaced regularly. In reality it is in the coat of a special varnish that the lines are placed, so as to reach the glass without acting on it. Then this is engraved with fluorhydric acid, the coat of varnish taken off, and the prints are covered with a special black varnish.

To obtain a cross-line screen, two ruled glasses are crossed and cemented on the edges.

OLD PROCESSES.

By P. C. Duchochois.

THERE are many processes, published years ago, now almost forgotten, which I think should be brought again to the attention of the readers of the ANNUAL; among them the following, which may render very good services to copper engravers, especially, and to manufacturers and amateurs, for the decoration of many objects:

One prepares an *ink* compounded with flowers of sulphur and gunpowder diffused in water to which a little albumen has been added. With this ink one draws on a sheet of well-sized paper and, when the design is dry, applies it on a copper (or silvered) plate, and places it under pressure for a few hours, when the design will be found impressed in black on the metal. The impression is reversed and therefore in the proper way for the engraver.

The original design, that is, the drawing in sulphur, is permanent, and, consequently, will serve to produce as many copies as are wanted at any time for years.

As above noted, the impression on the metal is reversed, but it

can be made in the right way by first drawing the image on one side of a sheet of tracing paper with lead pencil, then counter-drawing on the other side with the sulphur compound, whereby a reversed original is obtained, which will give impressions in the right way on the metal.

These impressions are indelible, resist rubbing, and therefore, if protected by a hard varnish, can be employed, as previously indicated, for the ornamentation of many fancy objects.

This method has been adapted to the carbon process, so called, to obtain images in half-tones. The manner of operating suggests itself: a sheet of paper is prepared by the Artigue, gum-arabic, or the ordinary carbon process with gelatine, using for pigment the compound of sulphur and gunpowder. This, the tissue, is sensitized, exposed under a cliché and developed with cold or warm water and by single or double transfer, according to the process selected, and, when dry, the proof is impressed on the metal in the same way as an original drawing.

THE PHOTOGRAVURE PROCESS.

By F. A. Ringler.

THIS process has revolutionized the methods of art production and has gone far towards extinguishing the school of copper-plate engraving, and that of the many devices invented in connection with the photo-engraving process of which only two remain in general use to-day,—the deposit and the etching processes. In this connection, the writer claims that in this country the name "Photogravure" is incorrectly given to the process of photo-etching, or helio-gravure, and that the true photogravure is that in which the deposit process is used and in which the work of the engraver plays no important part.

The chief points in the process, as worked by the F. A. Ringler Company, are as follows:—A negative of the painting, engraving, or work to be reproduced is first obtained. As in every other branch of photography, a good negative is essential to the production of a good print, and it sometimes happens that several trials have to be made before one of the desired quality is secured. A stripping film is used also in order that the negative may be reversed in the preliminary processes, and that in the final print the picture shall be in its proper position.

A picture in relief is then made by the use of the well-known principle of bi-chromatized gelatine, forming a mould which possesses (by chemical means) the much-prized chemical grain, and into which a copper plate "in deep" is deposited by means of an electro-depositing process. The deposit is exceedingly slow, from

ten to fifteen days being required for the accumulation of the required thickness of copper for the plate. It then goes to the engraver, by whom it is cleaned and finished.

The copper plate is then covered with an infinitesimal coating of steel by means of an electric current, so as to enable it to withstand the wear of printing. When this shows any signs of wear the steel coating can be dissolved off and another deposited, so that the number of prints which can be made from a single plate is almost unlimited.

The value of this method of working the process comes from the strength of the growing copper plate by electricity, and the grain, which is not obtained by any other biting acid.

SOME SCREENINGS.

By C. B. Talbot.

THAT the ordinary salts of silver, chloride, iodide, or bromide are only partially sensitive to the rays of light has been known since the earliest days of photography by development, as distinguished from those systems where the process depends on some dye, mordant, or pigment. Only within the last half-decade has the use of screens been applied to the sensitive-plate for imparting to, or withholding from, the haloid silver salts those qualities they require or should be prevented from receiving.

The old photographers generally recognized the fatal spots, and realized the defects of photography to equally represent in force the light in nature. The very first plate the young collodion-operator developed made the blue dress of his best girl as white as the fields of snow in winter. It was early found that a new or *colorless* collodion had more of this property than one a month or two old which had *reddened.* It was also observed that a thick or creamy variety of canary-colored bromide collodion, which had been *increased in color* by the addition of a small portion of the *old* or *red* collodion, increased its desirability as an interpreter of the general aspects of color as observed by the eye.

In the *Philadelphia Photographer*, November, 1871, Dr. S. Sellack, commenting on the photographic properties of iodide and bromide of copper (which are developable), calls particular attention to this quality—*a dark color in* the haloid; but while the copper was good he found no ready way to utilize that property in any easy manner. All eyes were on the heavens to discover the dawn of some new power in the silver or other salt, whereby Nature might seem more like herself as seen by the eye.

The wheels of time move on some years. One by one the mysterious cogs come round. By-and-by someone lays his finger on the trouble—the remedy is at hand. Just who discovered screen-photography cannot be told. It had its beginnings in a want where "necessity" was the "mother of invention"; where the users of that want were as numerous as the members of the profession. It is not my purpose to mention the honorable names which have so greatly adorned modern life, but to emphasize if I can the increased value of the screen which has been developed and brought into use by these inventors and promoters of screen-photography.

There are few pictures, unless it be copies in black-and-white, that are not in some degree better for the use of a screen, in some form or other. Even the black-and-white will be sharper and better if a proper screen be used; for it is possible to copy it so that its lines will be barely distinguishable from the background when too much light or diffusion, or too long an exposure, has been used.

Light is as tremulous and splendid a thing as the sounds from sweetest strings. We cannot use it well unless we have in some degree learned its limitations as well as its uses. To use it is not the wish or will of an hour any more than of the grand organ or viol. Its devotee must be a child of the sun, bound by an unnamed vow to cherish, love, honor, and obey. The use of the screen is as immediate and necessary as tune to the string.

The use of the screen may be defined as (1) *interceptive*, (2) *diffractive*, and (3) *receptive*—three distinct and separate qualities, all of which may or may not be combined in use on a single plate. Perhaps we should add a fourth variety, which might well be named *exclusive*. In the first variety of screens may be classed all those wherein the light is *filtered*. In the second, those which *intercept the light* by means of lines, dots, or a cross-line grating, by grained glass, or otherwise. In the third, those *having a coloring matter in the haloid* of the plate itself, or very near to it, as in gelatine or collodion. And in the fourth variety, all diaphragms, hoods, or shutters, in or outside the camera, whereby the *force of the light* is controlled. In this latter variety, the oldest and most used, invention has not yet completed its work. In the first three, —the younger,—we have only taken a few of the stronger steps of childhood.

The *first* variety, *interceptive*, includes all those whose office is corrective in the *quality* of the light delivered to the sensitive plate. These are always colored in various ways to restrict or entirely change the primal color, as that of the blue sky to a green, by using a yellow screen, or a red, changing the blue into a purple. In a combination of the two we have an orthochromatic landscape plate.

In the *second* class, *diffractive*, we have all those commonly used in engraving, for breaking up the monotone, and without which photo-engraving would lose one of its greatest powers. These are chiefly made with lines or dots on a glass plate, single or double ruled, on two or three glasses, by which various patterns and devices are had, which when placed *near* the sensitive plate break the surface into a system of lines or dots of an *opposite* description to that of the screen or grating. The labor, skill, and machinery required to make one of these is infinite, so much so that only a few experts make them for the world.

The *third* variety, *receptive*, is somewhat complex. It may be either in the material of the sensitive mixture—collodion or gelatine—or in close contact with it. Such an example is the orthochromatic plate, or a glass screen having a colored film or colored glass in front of and near the ordinary or common plate, the object being to change the light received from the lens, in whole, or in part, as to color, in order that the resultant may make a more harmonious image than one not so effected.

The *fourth* or *exclusive* screen, may be the lens-hood (projecting far in front) the lens-cap, or shutter, the diaphragms, or an internal shutter or curtain near the plate, used for modifying, lessening, or altogether excluding the light. The iris of the eye itself contracting and closing, is an example of this instrument, but only in a partial sense. The diaphragm or iris alone cannot do all that is required. This may be well illustrated by looking at some distant object highly illuminated by day with the eye alone. Now, nearly close the fingers of the hand, place them over the eye, and look through. The finer details of shadow and form, unseen before, are now seen. Precisely this effect is had in the camera by the lessening of the diaphragm. But there comes a time in long-focus lenses, sixteen or more inches, when something more is needed than the inner diaphragm, when its operations will become only exclusive, and diffusive, rather than a brightening and sharpening of the image. This may be well shown by taking a lens of three or four feet focus, placing therein a small diaphragm, say *f* 64; focus on some small and well-lighted objects—say grass-stalks in a field at a certain distance. Examine the image carefully with a magnifying-glass, place a stick in the nearest place where it is perfect. Now construct a shutter having a narrow slit, or opening horizontally, so that it can be operated on the out and inside of the camera at the same time. These slits should not be much over one sixteenth inch wide, and long enough to reach across the plate. Observe now the improvement in the *depth* of the image. Objects too distant to be well seen can now be well and plainly viewed. Now set another stick nearer the camera than the first one; where the limit of clear focus now ends. It will be found that it will approach the camera thirty or forty feet, sometimes

ending within fifteen or twenty feet; when with ordinary stops, it had been sixty or eighty feet distant to obtain a good focus. By this we have attained a very desirable quality without the loss of light, which would seem naturally to follow. If an actinometer is placed on the image it will appear as bright as before. Have the screen so that it can be opened, and then view the destruction; diffusion and confusion half destroy the image. This kind of a shutter may be best put in practice inside the camera and close to the plate. It seems that the exterior portion in front of the lens does not materially increase the effect. In nature we have something of this form of iris in all ruminant animals—sheep, cows, goats, deer, etc., and in some birds. The engraver has learned that he must have square apertures in his diaphragms, and other forms to do his work well behind the cross-ruled screen, because, do as he will, the light loves to leave its image in a circle, and he can only frustrate it by interposing angular gratings and stops.

Some deductions, from the above lead me to the thought that a better use should be made of the first variety of screen—the interceptive. Those which have been much used—collodionized plate-glass, bichromate, and other kinds of cells between the lenses, or behind the lenses—are well-nigh impracticable, or totally so, in long-focus lenses. In a certain sort of small camera they can be used with fair success, but not on a large instrument. In such, the diffraction cannot be corrected, the result being a diffusive, out-of-focus-appearing image. To avoid this difficulty, I have placed a very light-lemon-yellow glass, or a thin stained glass, close against the sensitive-plate. This aids in lessening the time of exposure, as the yellow is barely visible when used for restraining the sky blue or the water. Such a screen can be easily interposed in the holder of most film cameras, and may also assist in keeping the film in a better plane than now, in some of them. With the experience I have had, I am more than ever of the mind that all screens should be used only near the plate, as then the focal effects are better and more perfect.

The engraver's cross-lined screen is of necessity so placed, and has to be set in a different position for each size of diaphragm used. The improvement observable in half-tone engraving in the last year or two is largely the result of a better understanding in placing the screen, as well as a more careful handling in etching. In this latter branch we are coming to see the skilful use of the graver in over-cutting the shadows and high-lights where no art of the etcher can reach. (In this department I had expected to publish this year a method of photographic engraving by the graver only, in which that tool alone is used to the exclusion of etching, wherein I have had good success, and have developed several practical plans for accomplishing it although it has required twenty years for the task. I use only the original negative (or positive) and

no other is required; the blocks are as strong and clear as wood-engravings, and are much more under the control of the operator. But I shall have to defer an account of it until a later day, there being still so many things to learn and do.)

The split line and multangular screens do not seem to be coming into use as much as their merits would appear to warrant. It is, perhaps, owing to the difficulty of retaining a printing-film so delicate, on the plate used for etching. The least failure of the etching-ground is fatal to their use; the cross-line screen is solid and good; while not so full of resources, it is still good enough for the ordinary, and the even extraordinary, when a good man is at the helm.

The engraver, more than others, has a large field planted in screen-photograhy. Only the highest effects of photographic art are attainable by its use. As his reward, must come all advancement on these lines, as well as the resulting improvement in the admiration of a picture-loving and exacting people. The public will not go back to the old ways. Nothing but the truth of photography can tell the tale of war or story. Having begun a good work, our best men will not take their hands from the plow until the furrow is finished.



"SOME DOG."

Reproduced from "Good Housekeeping"
Publishing Co.
Springfield, Mass.

Photographic Tables and Formulas.

DRY PLATE DEVELOPERS.

PYROGALLOL.

CLIMAX PLATE.

No. 1.

Pyro..... 1 ounce.
Water..... 6 ounces.
Sulphuric acid.....10 drops.

No. 2.

Sulphite of soda (crystals)..... 6 ounces.
Sal soda..... 4 "
Water.....15 "

Dissolve and filter.

To develop.

For normal exposure, take two drachms No. 1, add 1 ounce No 2, water 6 ounces.

If more contrast is required, increase the amount of No. 1; if less, more of No 2.

BY HYDROMETER TEST.

No. 1.

Pyro..... 1 ounce.
Sulphuric acid.....10 drops.
Water.....12 ounces.

No. 2.

Equal parts of carbonate (sal) soda, test 40, and sulphite soda, test 60.

To develop.

Take No. 1, ½ ounce; No. 2, 2 ounces; water from 4 to 6 ounces.

In cold weather use less water.

M. R. HEMPERLEY'S FORMULA.

A—E. A. Pyro..... 1 ounce.
Oxalic acid.....10 grains.
Water.....12 ounces.
B—Sulphite of soda, 40 hydrometer.
C—Carbonate of potash, 15 hydrometer.
Carbonate of soda, 15 hydrometer.

To develop.

Take one drachm of A, ½ ounce of B, ½ ounce of C, and 1 ounce of water.

DAVIS AND SANFORD'S FORMULA.

No. 1.

Pyrogallic acid..... 1 ounce.
Water..... 12 ounces.
Oxalic acid..... 10 grains.

No. 2.

Equal quantities of
Sulphite soda solution to test 40° by hydrometer, and
Sal soda to test 60° by hydrometer.

To each drachm of No. 1 solution take 1 ounce of No. 2 and 3 ounces of water.

In using this developer it should be restrained with a little ten-per-cent. solution of bromide of potassium, or use in starting development half old and half new developer.

CRAMER PLATES.

Alkaline Solution.

Carbonate of sodium crystals (sal soda)..... 5 ounces.
Sulphite of sodium crystals..... 10 "
Water..... 60 "

A smaller quantity of sulphite will produce a warmer tone, a larger quantity a gray or bluish-black tone.

The alkaline solution must be kept in well-stoppered bottles.

If the negatives show yellow stain, make a fresh solution, or try another lot of sulphite of sodium.

To prepare the alkaline solution with the hydrometer, mix equal parts of the following solutions:
Carbonate of sodium solution (hydrometer test 40).
Sulphite of sodium solution (hydrometer 80).

Pyro Solution.

Dissolve 1 drachm sulphite of sodium crystals in 6 ounces distilled or pure ice-water, add acetic acid until the solution turns blue litmus paper red, and finally add 1 ounce pyrogallic acid.

Mix in the following proportions:
Pyro solution..... 1 drachm.
Alkaline solution..... 1 ounce.
Or tepid water (for winter use)..... 2 ounces.
Cold water (for summer use)..... 3 to 5 "

If the high lights are flat, use more pyro solution.

If they are too intense, use less pyro solution.

If too little pyro is used, the alkali will be in excess, and cause fog.

For Transparencies.

Sulphite of soda	8 ounces.
Carbonate of soda (crystals)	2½ "
Bromide of potassium	30 grains.
Water	64 ounces.

To every ounce of this solution add 3 to 5 grains of dry pyro. An excess of pyro will yield slides too heavy in the shadows and lacking in detail in the high lights.

CARBUTT'S.

No. 1.

Pyro Stock Solution.

Oxalic acid	15 grains	or	1 gram.
Bromide of potassium	30 "	"	2 "
Distilled or ice-water	10 ounces	"	300 ccm.

Then add Schering's pyro, 1 ounce (30 grams), and water to make 16 fluid ounces (480 cc.).

No. 2.

Soda Stock Solution.

Sodium sulphite (crystals)	4 ounces	or	120 grams.
Soda carb. crystals (or dry gran. 1 ounce).	2 "	"	60 "
Potash carbonate	1 ounce	"	30 "
Water	10 ounces	"	300 ccm.

Dissolve, and add water to make measure 16 fluid ounces (480 cc.).

No. 3.

Bromide Solution.

Bromide of sodium or potassium, ½ ounce (14 grams). Water, 5 ounces (150 cc.)

For Developer.

Dilute 2 ounces of stock No. 2 with 7 ounces of water for cold weather, and 10 to 12 of water in summer. To 3 ounces of dilute No. 2, add 1½ to 2½ drams (6 to 10 cc.) of No. 1. The more pyro the denser the negative, and *vice versa*. No yellowing or fogging need be apprehended if the directions are followed. Development should be continued until the image seems almost buried, then wash and place in fixing bath.

For instantaneous exposures take for a 5 x 8 or 6½ x 8½ plate 3

ounces of dilute No. 2. Lay the plate to soak in this, and cover pan. Put 2 drams of No. 1 into the graduate, and 3 drops of bromide solution. Pour the soda solution off of the plate into the pyro and back over the plate; let development proceed, and examine occasionally. Keep solution in gentle motion over the plate. A *very* short exposure may take ten minutes to fully develop. If the image is not fully brought out by this time, add to developer in pan three times its bulk of water, and let plate lie in it covered for half an hour or more if necessary, until full development is attained, then wash, and proceed as directed under head of developer.

HAMMER.

The two following pyrogallic acid formulas are recommended if strong, vigorous negatives are wanted. The quantity of sulphite of soda in the developer must be regulated to produce the color desired. If a developer, made according to either formula, produces negatives too cold and gray in tone, reduce the amount of sulphite until the quantity is found that produces the best color or tone. In many cases it may be reduced one half and produce better results; in some cases it may even have to be increased. This is regulated entirely by local conditions, such as quality of the water, condition of the sulphite soda, etc.

PYROGALLIC ACID DEVELOPER, WITH CARBONATE OF SODA.

No. 1.

Sulphite soda crystals	5	ounces or	150 grams.
Carbonate soda crystals	2½	" "	75 "
Pure water	30	" "	900 ccm.

No. 2.

Oxalic acid	15	grains or	1 gram.
Pyrogallic acid	1	ounce "	30 grams.
Pure water	24	ounces "	720 ccm.

To develop, take:

Solution No. 1	1	ounce or	30 ccm.
Solution No. 2	½	" "	15 ccm.
Pure water	3	ounces "	90 ccm.

More water may be used in warm weather, and less in cool weather.

See that the developing solutions are not too cold in cold weather, nor too warm in warm weather. This applies to all developers.

If Solution No. 1 is made by hydrometer test, use equal parts of the following:

Sulphite soda testing.....80°
Carbonate soda testing.....40°

One ounce of this mixture will be equivalent to one ounce of Solution No. 1.

PYROGALLIC ACID DEVELOPER, WITH CARBONATE POTASSIUM.

No. 1.

Sulphite soda crystals..... 8 ounces or 240 grams.
Carbonate potassium, *dry*..... 1 ounce " 30 "
Pure water.....32 ounces " 960 ccm.

No. 2.

Oxalic acid.....15 grains or 1 gram.
Pyrogallic acid..... 1 ounce " 30 grams.
Pure water.....24 ounces " 720 ccm.

To develop, take:

Solution No. 1 1 ounce or 30 ccm.
Solution No. 2.....½ " " 15 "
Pure water.....3 ounces " 90 "

When the plate is fully developed, if the high lights are too thin, use less water in the developer; if too dense, use more water.

AMERICAN.

No. 1.

Pyrogallic acid..... 1 ounce.
Sulphite of sodium (crystals).....60 grains.
Sulphuric acid, C. P.....15 minims.
Water..... 6 ounces.

No. 2.

Sulphite of sodium (crystals)..... 2 ounces.
Sal soda..... 1 ounce.
Water.....40 ounces.

To develop, use No. 1, 1 dram; No. 2, 4 ounces. For more ensity, use more of No. 1; for more detail, more of No. 2.

BY HYDROMETER TEST.

Make sulphite of soda solution to test 30; make sal soda solution to test 10; mix together in equal parts. To develop take pyro solution as in previous formula, 1 drachm; soda solution, 4 ounces.

EASTMAN (for films).

No. 1.

Pyrogallic acid..... ½ ounce.
Nitrous or sulphurous acid.....20 minims.
Water 32 ounces.

No. 2.

Sulphite of soda (crystals)..... 6 ounces.
Carbonate of soda (crystals)..... 4 "
Water.....32 "

To develop, take No. 1, 1 ounce; No. 2, 1 ounce; water, 2 ounces.

EASTMAN (for plates).

No. 1.

Sulphite soda (crystals)..... 6 ounces.
Pyrogallic acid..... 1 ounce.
Water.....32 ounces.

No. 2.

Carbonate of soda (crystals)..... 4 ounces.
Water.....32 "

To develop, take:

No. 1..... 1 ounce.
No. 2..... 1 "
Water.....3 to 4 ounces.

In warm weather use more water, in cold less.

THOMAS.

No. 1.

Pyrogallic acid..... 1 ounce.
Sodium sulphite..... 4 ounces.
Citric acid..... ¼ ounce.
Potassium bromide..... ¼ "
Distilled or boiled water to make.....20 ounces.

No 2.

Carbonate of soda..... 6 ounces.
Water, to make.....20 "

Take one drachm of each solution and 6 drachms of water to make each ounce of developer.

SEED.

No. 1.

Sulphite of soda (crystals)..... 4 ounces.
Pyrogallic acid..... 1 ounce.
Sulphuric acid.....10 drops.
Distilled or good well-water.....16 ounces.

No. 2.

Sal soda (crystals)..... 4 ounces.
Water.....16 "

To develop, take:

No. 1 1 ounce.
No. 2 1 "
*Water 8 ounces.

By Hydrometer Test.

No. 1.

Of a clear sulphite of soda solution to test 60 with hydrometer, take 18 ounces.
Pyrogallic acid 1 ounce.
Sulphuric acid 10 drops.

No. 2.

Sal soda solution, hydrometer test 40.

To develop, take:

No. 1 1 ounce.
No. 2 1 "
*Water 8 ounces.

Remarks—More water gives flatness, and less water contrast. Use less water in cold weather.

Seed (For non-halation Plate).

No. 1.

Sulphite of soda (crystals) 4 ounces.
Pyrogallic acid 1 ounce.
Distilled or good well-water 16 ounces.

No. 2.

Sal soda 4 ounces.
Water 16 "

To develop, take:

No. 1 ½ ounce.
No. 2 ½ "
Water 8 ounces.

New York.

No. 1.

Pyro Stock Solution.

Distilled or ice-water 10 ounces or 300 ccm.
Sulphite of soda 4 " " 120 grams.
Dissolve, then add
Pyrogallic acid 1 ounce or 30 "
and water to make up 16 fluid ounces, or 480 ccm.

* For double-coated plates use 18 ounces of water.

No. 2.

Stock Soda Solution.

Distilled or ice-water..... 10 ounces or 300 ccm.
Sal soda..... 4 " " 120 grams.

Dissolve, then add water to make up to 16 fluid ounces or 480 ccm.

No. 3.

Bromide Solution.

Bromide potassium ½ ounce or 14 grams.
Water..... 5 ounces or 150 ccm.

To develop, take:

No. 1, Pyro stock solution..... 1 ounce or 30 ccm.
No. 2, stock soda solution..... 1 " " 30 "
Water 6 ounces " 180 "

By Hydrometer Test.

No. 1.

Make stock solution of sulphite of soda to test 60° with hydrometer ; allow to settle perfectly clear ; then take:

Sulphite of soda solution..... 16 ounces.
Pyro..... 1 ounce.
Sulphuric acid 10 drops.
or:
Oxalic acid..... 10 grains.

No. 2.

Sal soda solution, hydrometer test 40°.

To develop, take :

No. 1..... 1 ounce.
No. 2..... 1 "
Water..... 8 ounces.

J. Ed. Rösch's Formula.

For E. A. Extra Resublimed Pyro.

Prepare the alkaline solution with the hydrometer, mixing equal parts of the following solutions:

Carbonate of sodium solution (hydrometer test 30).
Sulphite of sodium solution (hydrometer test 70).

Pyro Solution.

Dissolve one drachm sulphite of sodium crystals in 6 ounces distilled or pure ice-water, add acetic acid until the solution turns blue litmus paper red, and finally add 1 ounce pyrogallic acid.



Photographed by HAROLD SERRELL.
Engraved by
ELECTRIC CITY ENGRAVING CO.,
Buffalo, N. Y.

A MOUNTAIN ROAD.

Mix in the following proportions:

Pyro. solution	1 drachm.
Alkaline solution	1 ounce.
Tepid water (for winter use), or	2 ounces.
Cold water (for summer use)	3 to 5 "

E. H. NEWELL'S FORMULA.

For E. A. Extra Resublimed Pyro.

Soda Stock Solution.

Carbonate of soda	40° strong.
Sulphite of soda	60° "

Add together.

Pyro. Stock Solution.

Pyro	1 ounce.
Water	6 ounces.
Oxalic acid	10 grains.

Developer.

Soda solution	1 ounce.
Water	2 ounces.
Pyro. solution	1 dram.

J. S. SCHNEIDER'S FORMULA.

For E. A. Extra Resublimated Pyro.

No. 1.

Take equal quantities of sulphite of soda, 65 test, and carbonate of soda, 45 test, for stock solution.

No. 2.

Pyro	1 ounce.
Water	6 ounces.

Three or four drops of sulphuric acid, or just enough to turn blue litmus paper red.

To develop, take 1 dram of No. 2 to 1 ounce of No. 1, and 3 ounces of water.

PYRO—METOL.

HAMMER'S.

No. 1

Pure water	57 ounces	or	1710 ccm.
Sulphite soda crystals	2½ "	"	75 grams.
Metol	1 ounce	or	30 "

No. 2.

Pure water	57 ounces or	1710 ccm.
Sulphite soda crystals	2½ " "	75 grams.
Pyrogallic acid	¼ ounce or	8 "

No. 3.

Pure water	57 ounces or	1710 ccm.
Carbonate of potassium	2½ " "	75 grams.

To develop, take :

Pure water	3 ounces or	90 ccm.
Solution No. 1	1 " "	30 "
Solution No. 2	1 " "	30 "
Solution No. 3	1 " "	30 "

This developer may be used repeatedly by adding a little fresh developer as required.

Keep the used developer in separate bottle.

It combines the desirable qualities of metol and pyro, and gives an ideal negative.

WUESTNER'S.

No. 1.

Pyro and Metol Stock Solution.

Sulphite of soda, (crystals)	8 ounces.
Pyrogallic acid	½ ounce.
Metol, Hauff's	½ "
Sulphuric acid, C. P.	5 drops.
Water	40 ounces.

No. 2.

Soda Stock Solution.

Sal. soda, (crystals)	4 ounces.
Water	40 "

Developer.

Take 2 ounces of No. 1, and 2 ounces of No. 2, and add 8 ounces of water. The beauty of this developer is, that when the pyro. ceases to do its work, the metol will continue and bring out all the details in the shadows.

Another.

No. 1.

Oxalic acid	¼ ounce.
Pyrogallic acid	1 "
Metol, (Hauff's)	¼ "
Bromide of potassium	1 gram or 16 grains.
Water	16 ounces.

No. 2.

Sulphite of soda, (crystals)	8 ounces.
Carbonate of soda	4 "
Water	64 "

To develop, take of No. 1, 1 ounce and No. 2, 5 ounces, and add from 2 to 4 ounces of water.

METACARBOL.

Metacarbol	25 grains.
Sulphite of soda (crystals)	100 "
Sodium hydrate (caustic soda)	50 "
Water	10 ounces.

Dissolve the metacarbol in the water, add the sulphite of soda, and, when this is dissolved, add the sodium hydrate and filter. With this developer the time of exposure is considerably reduced.

Another formula is:

Metacarbol	½ ounce.
Caustic soda	1 "
Sulphite of soda	2 ounces.
Water	50 "

First dissolve the metacarbol and caustic soda in a little of the water (hot), and then add the sulphite of soda and balance of water.

For use, take 1 ounce of this solution and 2½ ounces of water. Use this repeatedly, by adding a little fresh solution from time to time.

Another formula, recommended by John Strathmann, is:

A—Metacarbol (dissolved in 3⅓ ounces water)	25 grains.
Sulphite of soda (15 hydrometer)	3⅓ ounces.
B—Sodium hydrate (20 hydrometer).	

For use take

A	2 ounces.
B	1 ounce.
Water	3 ounces.

For under-timed plates use more of B. For over-timed plates use less of B, or use old developer.

HYDROCHINON.

CARBUTT.

A.

Warm distilled water	20 ounces	or	600 ccm.
Sulphite soda (crystals)	4 "	"	120 grams.
Sulphuric acid	1 dram	"	4 "
Hydrochinon	360 grains	"	23½ "
Bromide potass	30 "	"	2 "
Water to make up to	32 ounces	"	960 ccm.

B.

Carbonate potash	2 ounces	or	60 grams.
Carbonate soda (crystals)	2 "	"	60 "
Water to make	32 "	"	960 ccm.

C.

Accelerator.

Caustic soda	1 ounce	or	30 grams.
Water	10 ounces	"	300 ccm.

For under-exposure add a few drops of above to developer.

D.

Restrainer.

Bromide potass	½ ounce	or	14 grams.
Water	5 ounces	"	150 ccm.

To develop.

For instantaneous exposures, take—*A*, 1 ounce or 30 ccm.; *B*, 1 ounce or 30 ccm.; *water*, 4 ounces or 120 ccm.

For portraits—*A*, 1 ounce or 30 ccm.; *B*, 1 ounce or 30 ccm.; *water*, 5 ounces or 150 ccm.

For landscapes (Sen 20–27)—*A*, 1 ounce or 30 ccm.; *B*, ½ ounce or 15 ccm.; *water*, 3 ounces or 90 ccm.

For landscapes, full exposure (Sen 16–20)—*A*, 1 ounce or 30 ccm.; *B*, ¾ ounce or 25 ccm.; *water*, 4 ounces or 120 ccm.

For lantern slide—*A*, 1 ounce or 30 ccm.; *B*, ¾ ounce or 25 ccm.; *water*, 4 ounces or 120 ccm.

For lantern slides and full exposures—*A*, 1 ounce or 30 ccm.; *B*, ¾ ounce or 25 ccm.; *water*, 4 ounces or 120 ccm.; and 2 to 6 drops restrainer *D* to each ounce of developer. (See below.)

Note.—More of *A* will increase density, more of *B* will increase detail and softness. Temperature of developer should not vary much below 65 degrees nor above 75 degrees. The after-treatment is the same as with any other developer.

For Lantern Plates, Process Plates, and Large Transparencies.

No. 1.

Hydrochinon Solution.

Water (distilled or boiled), warm	10 ounces.		
Sulphite of soda crystals	1 ounce.		
Sulphurous acid	½ "		

Mix with 2 ounces cold water and add slowly to the sulphite solution, then add:

Hydrochinon	100 grains.		
Bromide potassium	30 "		
And water to make the whole measure	15 ounces.		

No. 2.

Alkali Solution.

Water	3 ounces.
Carbonate soda crystals	1 ounce.
Carbonate potash	½ "
Water to make the whole measure	5 ounces.

To form a developer, mix one part No. 2 with three parts No. 1.

CRAMER.

For producing great contrast and intensity, and for developing over-exposed plates.

No. 1.

Distilled or ice water	25 ounces.
Sodium sulphite (crystals)	3 "
Hydrochinon	½ ounce.
Potassium bromide	¼ "

Dissolve by warming and let cool before use.

No. 2.

Water	25 ounces.
Sodium carbonate	6 "

To develop, mix equal parts of Nos. 1 and 2.

BYK'S.

Hydrochinon	5 grams.
Potassium carbonate	75 "
Sodium carbonate	40 "
Water to make	1000 "

Mix in reverse order. Use full strength.

DR. JUST'S.

No. 1.

Hydrochinon	10 parts.
Sulphite of sodium	60 "
Distilled water	240 "

No. 2.

Carbonate of potassium	120 parts.
Acetic acid	15 "
Distilled water	480 "

To develop, mix the solution in equal parts for use. The best results are obtained by commencing development with an old or once-used developer, and when development is half completed, applying fresh.

MIETHE.

No. 1.

Sulphite of soda	35 grams.
Yellow prussiate of potash	30 "
Hydrochinon	7 "
Water	550 ccm.

No. 2.

Caustic potash	30 grams.
Water	550 ccm.

To develop, use three parts of No. 1, and two to three parts of No. 2, according to exposure and desired density.

EDWARDS.

Carbonate of sodium (granulated)	100 grains.
Sulphite of sodum (crystals)	480 "
Hydrochinon	100 "
Water	14 ounces.

Use full strength.

DR. PIFFARD'S.

Sodium sulphite	480 grains.
" carbonate	960 "
Hydrochinon	96 "
Water	16 ounces.

Mix and filter. This developer may be used repeatedly.

EIKONOGEN.

No. 1.

Sodium sulphite (crystals)	2 ounces.
Eikonogen (finely powdered)	1 ounce.
Water	40 ounces.

No. 2.

Potassium carbonate	1 ounce.
Water	10 ounces.

To develop, take 3 ounces of No. 1, and 1 ounce of No. 2. As a restrainer, use a few drops of a ten per cent. solution of potassium bromide.

FOR CLIMAX PLATES.

No. 1.

Eikonogen	1 ounce.
Sulphite soda	1½ ounces.
Water	45 "

No. 2.

Carbonate potash.....1½ ounces.
Water.....15 "

To develop, take three ounces No. 1; one ounce No. 2, half old and half new developer; when about half done place it in new developer, three to one, as above, and carry it well along.

Can be used over and over by adding a little fresh developer each time. Any amount of density may be obtained with this developer by varying the proportions and a normal exposure.

EASTMAN.

No. 1.

Sulphite soda (crystals)..... 3 ounces.
Eikonogen 1 ounce.
Water 60 ounces.

No. 2.

Carbonate of potash..... 3 ounces.
Water 30 "

To develop, take:

No. 1..... 2 ounces.
No. 2..... 1 ounce.
Water 2 ounces.

If you desire to have the developed negative of a warm tone add 100 grams. pyrogallic acid to No. 1 stock solution.

AMERICAN.

No. 1.

Sulphite of soda (hydrometer test 30).....40 ounces.
Eikonogen 1 ounce.

No. 2.

Potassium carbonate to test 10°.

To develop, use equal parts. For more contrast use more of No. 1. For more detail use more of No. 2.

WUESTNER'S FOR PORTRAITS AND LANDSCAPES.

No. 1.

Sulphite of soda (crystals).....	3½ ounces	or	115 grams.
Oxalic acid.....	1 dram.	"	4 "
Eikonogen.....	2½ ounces	"	75 "
Yellow prussiate of potash.....	½ ounce	"	15 "
Distilled water.....	80 ounces	"	2400 ccm.

Dissolve the eikonogen in hot water.

Carbonate of potash.....	2 ounces	or	60 grams.
Distilled water.....	20 "	"	600 ccm.

Developer:

Take 4 ounces of No. 1, and ½ ounce of No. 2.

For aristo paper printing, to obtain thin negatives, dilute the developer more. For more intensity, add to No. 1, 10 grams. of hydrochinon.

NEW YORK.

No. 1.

Distilled or ice water	60 ounces.
Eikonogen	1 ounce.
Sulphite soda (crystals)	3 ounces.
Sulphurous acid	½ ounce.

Dissolve the eikonogen in 30 ounces of the water, warmed, dissolve the sulphite in 20 ounces, and dilute the acid in 10 ounces. Pour the sulphite solution into the eikonogen, then add the acid to the whole. Never pour the eikonogen into the sulphite solution.

No. 2.

Carbonate soda (granular)	4 ounces.
Water	40 "

To develop, take:

No. 1	4 ounces.
No. 2	4 "
Water	5 "

Add 10 drops of a 10 per cent. solution of bromide ammonium. In hot weather increase the water to 10 ounces.

This developer can be used repeatedly by occasionally adding more of solutions No. 1 and No. 2.

To obtain thin negatives, full of detail, such as are required for printing on aristo paper, use the developer more diluted.

After development wash thoroughly under tap, and immerse in fixing bath.

CARBUTT'S.

A.

Distilled water	20 ounces	or	600 ccm.
Sulphite of soda (crystals)	4 "	"	120 grams.
Eikonogen	330 grains	"	22 "
Hydrochinon	160 "		10½ "
Water to make up to	32 ounces	"	960 ccm.



Photographed by F. G. KNEER, M.D.
Engraved by
PHOTO-CHROMOTYPE ENGRAVING CO.,
Philadelphia, Pa.

THE LAKE AT MT. WASHINGTON, MASS.



B.

Distilled water	20	ounces or	600 ccm.
Carbonate of potash	2	" "	60 grams.
Carbonate of soda (crystals)	2	" "	60 "
Water to make up to	32	" "	960 ccm.

To develop, see Carbutt's hydrochinon developer.

SEED.

No. 1.

Sodium sulphite (crystals)	4	ounces.
Eikonogen	240	grains.
Hydrochinon	60	"
Distilled or pure well water	32	ounces.

No. 2.

Carbonate of potash	4	ounces.
Water	32	"

To develop, take:

No. 1	2	ounces.
No. 2	1	ounce.
[1] Water	1	"

More water gives less contrast and density.

BY HYDROMETER TEST.

No. 1.

Sodium sulphite solution to test 30	34	ounces.
Eikonogen	240	grains.
Hydrochinon	60	"

Carbonate of potash solution to test 50.

To develop, take:

No. 1	2	ounces.
No. 2	1	ounce.
Water	1	"

For Lantern Slides and Transparencies.

No. 1.

Distilled water	20	ounces.
Sodium sulphite (crystals)	1	ounce.
Citric acid	20	grains.
Eikonogen	120	"
Hydrochinon	60	"

[1] For double-coated plates use 5 ounces ofwater.

No. 2.

Distilled water	20 ounces.
Caustic potash	120 grains.
Potassium bromide	120 "

To develop, take two parts No. 1 and one of No. 2.

ROOT'S DEVELOPER.

No. 1.

Sodium sulphite (crystals)	2½ ounces.
Eikonogen	1 ounce.
Hydrochinon	⅛ "
Water	64 ounces.

No. 2.

Potassium carbonate (dry)	2½ ounces.
Water	64 "

To develop, take two parts of No. 1, and one part of No. 2, and old developer to give best results.

FERROUS OXALATE.

Neutral oxalate of potash, saturated solution. Protosulphate of iron, saturated solution, 10 drops sulphuric acid.

To develop.

Oxalate solution	10 ounces.
Iron solution	2 "
Old (used) developer	2 "

FOR TRANSPARENCIES AND OPALS.

CARBUTT'S

A.

Oxalate of potash	8 ounces.
Citric acid	60 grains.
Citrate of ammonia solution	2 ounces.
Water	30 "

B.

Sulphate of iron	4 ounces.
Sulphuric acid	16 drops.
Water	32 ounces.

C.

CITRATE OF AMMONIA SOLUTION.

Dissolve 1 ounce citric acid in 5 ounces distilled water, add liquor ammonia until a slip of litmus paper just loses the red color; then add water to make the whole 8 ounces.

Developer.

Add 1 ounce of B to 2 of A, and ½ ounce of water, and 3 to 6 drops of 10 per cent. solution bromide potass.

To develop, first rinse developing dish with water, lay film or plate down, and flow with sufficient developer to well cover. Careful attention must be given to its action, and when detail is just showing in the face, or half-tone lights in a view, pour off developer, and well wash the film before fixing.

METOL.

SEED.

No. 1.

Metol	100 grains.
Sodium sulphite (crystals)	1 ounce.
Water	8 ounces.

No. 2.

Potassium carbonate	1 ounce.
Water	10 ounces.

To develop, take 1 ounce of No. 1, 1 ounce of No. 2, and 5 ounces of water.

FOR BUFFALO ARGENTIC BROMIDE PAPER.

Stock Solutions.

No. 1.

Oxalate of potash	5 pounds.
Oxalic acid	600 grains.
Water	240 ounces.

No. 2.

Sulphate of iron	1 pound.
Sulphuric acid, C. P	¼ dram.
Water	32 ounces.

No. 3.

Sulphite soda	2 ounces.
Citric acid	160 grains.
Bromide ammonia	" "
Water	16 ounces.

When cool they are ready for use.

After exposing the paper to negative, either contact or enlargement, place it, film up, in a suitable tray, and pour over it sufficient water to thoroughly cover it; allow to remain until it

lies limp and smooth, then pour off, making sure there are no air bells adhering to the surface, and flow over it the developer prepared from the following solutions:

For a 16 x 20 print, take of No. 1, 4 ounces; No 2, 6 drachms; No. 3, from 1 to 2 drachms. Keep tray in constant motion to insure even reduction; the image should appear in about half a minute, and continue slowly gaining strength and brilliancy, and be completed in about three to five minutes. When development is complete, pour off the developer and flow over the print the

Clearing Solution.

Prepared as follows:

Acetic acid..... ¼ ounce.
Water.....60 ounces.

Use from 20 to 30 ounces for each flow, and thoroughly immerse back and face for one half minute; pour off, and repeat the operation twice; rinse with three changes of clear water, then immerse in

Fixing Bath.

Hyposulphite soda..... 1 pound.
Sat. sol. alum..... ½ ounce.
Water.....64 ounces.

Leave in this from ten to twenty minutes, making sure it is completely covered; after fixing, wash thoroughly for at least two hours, then hang up to dry, or mount at once. Keep developer and all solutions below 60° F.

Prints from thin, weak negatives should be developed with part old developer, or fresh developer mixed as follows: No. 1, 4 ounces; No. 2, ½ ounce; No. 3, 2 drachms. Prints from extra strong or dense negatives should be developed by mixing as follows: No. 1, 4 ounces; No. 2, 4 drachms; No. 3, ½ drachm; water, 4 ounces. The former treatment produces strength and contrast, and the latter reduces it. Many negatives require special treatment. The above applies to the two extremes, and should be modified according to the negative.

FOR BROWN OR SEPIA TONES.

Uranium Toning Solution.

No. 1.

Ferricyanide of potassium.....8 grains.
Water.....8 ounces.

When thoroughly dissolved, add 6 drachms glacial acetic acid, or 12 drachms if No. 8 acetic acid is used.

No. 2.

Nitrate of uranium.....8 grains.
Water.....8 ounces.

When thoroughly dissolved, add to No. 1. Should any precipitate form, filter. If the print tones too slowly, add more nitrate of uranium.

Tone at least a third warmer than you wish the finished print to be when dry, as the color is reduced in the washing.

Important.—All prints that have been developed with oxalate and iron, and which are to be toned in the uranium solution, should be treated (after having been fixed and thoroughly washed) with a solution of oxalate of potash for at least three minutes, of the following strength: No. 1, 4 ounces; water, 4 ounces; then wash for half an hour in running water, and then tone.

FOR VELOX PAPER.

PRINTING.—Open package of paper by gaslight or very subdued daylight.

An average negative requires, ordinarily, an exposure of from one to eight seconds to diffused daylight a few feet away from northern window; electric arc-light requires about the same exposure. Welsbach gaslight needs several seconds more than an arc-light; an ordinary gas-jet, or a kerosene lamp, at a distance of three or four inches from negative, will yield a print in one or two minutes. Very dense negatives require much more time, while very weak ones require less. All "special velox" papers require less exposure than ordinary velox. Use a strip of paper to ascertain the proper length of exposure before proceeding with regular printing, and keep your printing-frame always at the same distance from the light.

DEVELOPING.—After exposure, develop with any of the developers given below, at a safe distance of a few feet from an ordinary gas or lamp-light. Ruby light is absolutely needless.

ESSENTIAL CONDITION OF SUCCESS.—Use strong and fresh developer with just enough bromide to insure pure whites. More bromide gives greenish blacks. Before developing dip the sheet of paper for one or two seconds in a pail of water.

With any of the indicated developers development is very quick, except with "special velox," and takes only a few seconds. In fact, you do not need a tray, as the exposed print may be put on a glass plate, and the developer spread abundantly and uniformly over its surface by means of a brush or a tuft of cotton. The image will appear suddenly; somewhat more slowly for all "special velox" papers. As soon as it is strong enough, dip quickly in water and throw into the following:

Hypo Acid Fixing Bath.

Hypo	16 ounces.
Water	64 "

Then add the following hardening solution:

Sodium sulphite crystals	½ ounce.
Acetic acid No 8 (or about 4½° B)	3 ounces.
Powdered alum	½ ounce.
Water	5 ounces.

This mixture keeps perfectly clear, and can be made up any time in advance. It can be used as long as it is strong enough.

Keep your prints moving in the fixing bath during the first few seconds, so as to insure uniform and thorough fixing, thus preventing stains and yellow whites.

Fix ten or fifteen minutes, then wash from twenty minutes to one hour in running water. Longer fixing in summer may turn the prints brown. Imperfect washing will produce fading prints.

Developers.

Any of the following formulæ may be used with success. Be sure, however, to have your chemicals pure, especially your sulphite, and not to let your developers become spoiled by oxidation; therefore, keep it in small, well-stoppered bottles filled to the neck. Rubber stoppers are recommended. Too weak a developer, or one that is oxidized or contains too much bromide, will give greenish or brownish blacks.

It is almost invariably necessary, in order to prevent foggy or stained whites in prints, to add a small quantity of a 10% bromide of potassium solution to the developer. This quantity will vary according to purity of chemicals and water. "Special velox" can stand more bromide and further dilution than ordinary velox.

Metol Quinol.

Metol	7 grains.
Sodium sulphite, (crystals pure)	½ ounce.
Hydroquinone	30 grains.
Sodium carbonate, desiccated [1]	200 "
10 per cent. bromide of potassium solution, about	10 drops.
Water	10 ounces.

Amidol.

Sodium sulphite, (crystals pure)	200 grains.
Amidol	20 "
10 per cent. bromide of potassium solution, about	5 drops.
Water	4 ounces.

[1] If you use crystallized carbonate of sodium, take double this quantity.

Metol.

Metol	25 grains.
Sodium sulphite, (crystals pure)	½ ounce.
Sodium carbonate, desiccated[1]	120 grains.
10 per cent. bromide of potassium solution, about	20 drops.
Water	10 ounces.

CAUSES OF NON-SUCCESS ON VELOX PAPER.

IMPURE WHITES.—Lack of bromide in developer. Add a few more drops of a 10% bromide of potassium solution, or a somewhat larger amount of kitchen salt. May be caused also by trying to force the development of undertimed prints or by not moving prints in hypo bath. Possibly light-struck paper.

GREENISH OR BROWNISH BLACKS.—Too weak or too old developer; too much bromide in the developer; oxidized developer; over-exposure. Take a more concentrated developer or use less bromide. Strong developer can stand more bromide than a weak one without giving greenish blacks.

CONTRASTY PRINTS.—Negative too harsh, make softer negatives. Increase slightly the exposure. Use "special velox" which works softer.

PRINTS TOO WEAK.—Under-exposure or developer too weak.

PRINTS TOO BLACK.—Over-exposure. See also "impure whites."

YELLOW STAIN SOMETIMES IRREGULAR IN SHAPE.—Developer not spread uniformly over the prints or too long a time elapsed between developing and fixing. You should immerse immediately and completely in the acid hypo after developing and keep your prints moving during the first few seconds after immersion. Stain all over the film is the result of trying to force the development of undertimed prints; or too weak a developer; or incomplete fixing; or insufficient washing after fixing; or wash-water containing iron. In case of incomplete fixing or incomplete washing, the prints will have a sweet taste. Yellow whites may be avoided by rinsing prints before fixing.

PURPLE OR BROWNISH STAINS.—Incomplete fixing. Leave longer in the hypo; use stronger hypo; keep prints moving in hypo. Try rinsing prints before fixing.

BLISTERS.—Prints have been creased or broken while washing. Do not allow water to run directly from the faucet on to the prints. Add some alum to your hypo so as to harden the film. Too acid or too strong hypo may cause this.

DISCOLORATION AROUND THE EDGES.—If the centre of the print is clear it indicates that the paper has been kept in a place where it has been submitted to chemical emanations, (ammonia

[1] If you use crystallized carbonate of sodium, take double this quantity.

vapors; light-gas, sewer-gas, etc). May be caused also by not spreading the developer evenly and abundantly over the prints. May be removed by using hypo and ferricyanide.

ROUND WHITE SPOTS.—Air-bubbles on the surface of the paper, which may be removed by means of the finger while the print is developing.

PICTURE DEVELOPING IRREGULARLY and appearing to be covered with irregular greasy streaks, as if the paper was not coated uniformly or had been touched with greasy fingers. This defect occurs while developing, especially with glossy and special velox, and is the result of the use of impure sulphite which contains sulphate. Too diluted a developer may cause this same defect. Soaking the paper in water before developing will avoid it.

PICTURE IS GOOD, BUT SURFACE IS COVERED WITH STAINS RUNNING IN ONE DIRECTION, WHICH LOOK LIKE PENCIL MARKS.—This defect occurs mostly with glossy velox, and is the result of pressure or friction. It can be avoided to a certain extent by increasing the amount of bromide in the developer. These surface stains can easily be removed from the dry print by rubbing the same with a tuft of cotton dipped in wood alcohol. Another way of getting rid of surface stains on glossy velox is to put the prints for a few seconds in a hypo solution of about 30° hydrometer test (10 per cent. or specific gravity 1050), to which a few drops of a concentrated solution of red prussiate of potash (ferricyanide of potassium) have been added. This bath only works when freshly prepared. The more prussiate is added the quicker the bath will act. If prints are left in it too long the image will turn yellow in the half-tones. There is, of course, a very slight reduction in the strength of the prints. After this the prints should be thrown at once into abundant wash-water and washed as usual. The treatment with hypo and ferricyanide may be employed, either when the prints leave the fixing bath or after they are dry. This is a much easier method than cleaning them with alcohol. The same method may be used for reducing overtimed prints or those of which the whites are slightly "fogged."

SAME NEGATIVE AND SAME DEVELOPER MAY GIVE DIFFERENT RESULTS ON GLOSSY VELOX AND ON MATT VELOX.—Some coatings may require a stronger developer, more bromide in the developer, and somewhat longer exposure than matt velox.

DIRECTIONS FOR USING EASTMAN'S ROYAL BROMIDE PAPER.

Concentrated Solution.

The concentrated stock solution is prepared by dissolving in succession in



Photographed by GEO. STECKEL.
Engraved by
BALTIMORE ENGRAVING CO.,
Baltimore, Md.

A CONVENTION PRIZE WINNER.

P. A. of A., 1898.

Water.....12 ounces.
Sodium sulphite crystal..... 3 "
Amidol..... ½ ounce.

Enough of this stock solution should be prepared at one time for one day's use.

To develop.

Take in a suitable tray:

Concentrated stock solution.....1½ ounces.
10 per cent. solution, bromide of potassium.....8 drops.
Water.....6 ounces.

Use cold. After exposure, soak the paper in water until limp, and brush lightly over the surface while wet with a tuft of cotton; then immerse in the developer.

The image should appear slowly, and should develop up strong, clear, and brilliant. When the shadows are sufficiently black, pour off the developer, and rinse the print thoroughly with pure water. If the print has been over-exposed a small quantity of a solution of bromide of potassium should be used as a restrainer.

NOTE.—The above developer can be used over by the addition from time to time of some fresh developer. If, however, the restrainer solution has been added to it, the developer should not be used again except for prints that are known to have been over-exposed.

Immerse print for ten minutes in the

Fixing Bath.

Hyposulphite soda..... 3 ounces.
Water.....16 "

After fixing, wash thoroughly two hours and hang up to dry.

Important Details.

With a glass tray 7 ounces of developer are sufficient for a 25 x 30 print.

CLEAN DISHES—CLEAN HANDS.—The faintest trace of hyposulphite of soda or of pyrogallic acid is fatal to good results with bromide paper, and the operator cannot be too careful to avoid any contamination.

Do not use concentrated solution more than twenty-four hours old.

Fresh hypo solution is required for fixing each batch of prints.

The washing must be thorough after fixing.

Mealy prints are caused by over-exposure.

Other developers (except pyrogallic acid and iron) may be used to develop Eastman's Royal Bromide Papers, formulas for the use of which accompany the chemicals.

We recommend amidol on account of its producing the most uniformly satisfactory results.

Contact Printing.

Daylight, gas, lamp, or candle-light may be used.

The exposure varies with the intensity of the negative and the quality and intensity of the light, but may be approximately stated to be, using as thin a glass negative or film as will make a good print, one second by diffused daylight, or ten seconds at a distance of one foot from a No. 2 kerosene burner.

Owing to the broad effects and the rough texture of the paper, we do not recommend Royal Bromide for prints smaller than 8 x 10.

Enlarging.

If one has a weak negative to enlarge by daylight, a strong print may be obtained from it by varnishing the back with ordinary negative varnish, slightly tinted with a yellow aniline dye. Where many such negatives have to be treated, separate glasses tinted to various shades of yellow may be employed, one of these glasses being put directly behind the negative, between it and the source of light. Only a very slight yellow tint is required to increase the contrast in the resulting print to a marked degree.

A glass tinted with blue varnish will reduce contrast.

Mounting.

ON CARD.—Royal Bromide prints should be mounted wet. Lay the wet print face down on table covered with oil- or rubber-cloth or sheet of glass, and squeegee off all the surplus water; then brush over the back with thin starch paste; lay the print on the mount; then cover the print with a clean piece of cotton cloth, and rub into contact with a soft cloth.

CLOTH MOUNTING.—Enlargements are usually mounted on cloth-covered strainers as follows: Take a frame, such as artists use for stretching canvas, and cover it with common white cloth; put the cloth on dry, stretching it tight, and tacking along the edges. Lay the wet print face down on table covered with oil-cloth or rubber-cloth or sheet of glass, and squeegee off the surplus water; then brush over the back with thin starch paste, give the cloth on the strainer a coat of paste, lay the print on the strainer; then turn the strainer and print over, and lay face down on table or glass, and rub in contact with soft cloth; then turn the strainer over and cover with a clean piece of cotton cloth and rub in con-

tact with hand or soft rag; rub under the frame with a paper or palette knife, and remove what paste may have come through the back of cloth under the frame, or the inside edges of strainer will show through. When dry, the print will be stretched smooth and tight.

STRAIGHTENING UNMOUNTED PRINTS.—After drying, prints may be straightened by the scraping action of a sharp-edged ruler applied to the back, the corner behind the ruler being lifted as the ruler is passed along.

FOR SEPIA TONES ON EASTMAN'S ROYAL BROMIDE PAPER.

HYPO TONING BATH.

Directions.

By using the following formula rich brown and sepia tones can be readily obtained. The tones produced are believed to be permanent and not subject to the bronzing in the shadows which occur in bromides toned with uranium. For the best results the prints should be *slightly* overtimed and have short development.

After prints are fixed and washed they may be transferred direct to the toning solutions; it is, however, preferable that they should be dried first and then toned, as there is less liability to frill and blister.

Formula.

Hyposulphite of soda.....20 ounces.
Ground alum..... 4 "
Hot water, not over 150° F..... 1 gallon.

Dissolve the hypo in the water first, then add the alum slowly; when all is dissolved the solution should be milk white. This solution should not be filtered, and must be mixed twelve hours before use.

FIRST HARDENING SOLUTION.—Previous to toning, prints should be immersed for five minutes in a solution of above formula, which is to be used at a normal temperature of about 65 or 70° F.

Brush lightly over the surface while in first hardening solution with a tuft of cotton before placing in hot toning bath.

To tone take a suitable quantity of above mixture, heat to 130° F., remove prints directly from cold solution to warm solution, where they should remain until the desired tone is obtained; transfer to

SECOND HARDENING SOLUTION.—

Alum..... 2 ounces.
Water.....70 "

Finally, wash thoroughly.

Details.

The object of putting the print in a cold toning bath first is to harden the gelatine before putting it in a hot bath. Plain alum solution will not answer because transferring the prints from it will overcharge the bath with alum.

Several prints may be toned in the hot bath together, or one immediately after the other, providing the bath is kept constantly hot.

The final alum bath is used to prevent blisters; it need not be used unless they occur.

The toning takes from ten minutes to half an hour in warm bath.

HAMMER.

No. 1.

Pure hot water	80 ounces	or	2400 ccm.
Metol	1 ounce	"	30 grams.
Hydrochinon	$\frac{1}{8}$ "	"	4 "
Sulphite soda crystals	6 ounces	"	180 "

No. 2.

Pure water	80 ounces	or	2400 ccm.
Carbonate soda crystals	5 "	"	150 grams.

To develop, take:

Pure water	2 ounces	or	60 ccm.
Solution No. 1	1 ounce	"	30 "
Solution No. 2	1 "	"	30 "

We have frequent requests for a formula for a small quantity of developer, hence the following:

No. 1.

Pure water	8 ounces	or	240 ccm.
Sulphite soda crystals	150 grains	"	10 grams.
Eikonogen	60 "	"	4 grams.
Hydrochinon	8 "	"	$\frac{1}{2}$ gram.

No. 2.

Pure water	8 ounces	or	240 ccm.
Carbonate potassium, *dry*	150 grains	"	10 grams.

To develop, take:

Solution No. 1	2 ounces	or	60 ccm.
Solution No. 2	1 ounce	"	30 "

Can be used repeatedly until exhausted.

NEW YORK.

12 ounces sulphite soda solution to test 25° by hydrometer.
12 ounces carbonate soda solution to test 15° by hydrometer.
50 grains metol.
60 grains hydrochinon.

To develop, take 1 ounce of solution to 2 ounces of water. For instantaneous or undertimed exposures, use equal quantities of the solution and water.

WUESTNER'S, FOR SNAP-SHOT EXPOSURES.

Make a sulphite of soda (crys.) solution.....hydrometer test, 30°.
And a carbonate of soda solution.....hydrometer test, 20°.
Dissolve 2 grams (30 grains) of metol (Hauff's) in 2 ounces of water.
Dissolve 2 grams (30 grains) of hydrochinon in 2 ounces of water.

Developer.

Take 10 ounces of the sulphite of soda solution, and 10 ounces of the carbonate of soda solution; add the metol and hydrochinon, and your developer is ready.

This developer can be used repeatedly.

METOL AND HYDROCHINON.

CLIMAX.

Metol	70	grains.
Hydrochinon	50	"
Water	80	ounces.
Sulphite soda (crystals)	4	"
Sal soda	2½	"

Dissolve sulphite *first* before adding other chemicals.

NOTE.—This is a very energetic developer, and is strongly recommended for under-exposed plate. It can be used repeatedly.

CRAMER.

Thoroughly dissolve:

Metol	¼	ounce.
Hydrochinon	¼	"
In water	80	ounces.

Then add

Sulphite of soda (crystals)	4	ounces.
Carbonate of soda (crystals)	2½	"

To prepare this with hydrometer, mix
20 ounces sulphite of soda solution, testing 60
20 ounces carbonate of soda solution, " 30
¼ ounce metol, ¼ ounce hydrochinon, } dissolved in 40 ounces water.

For summer use, dilute the developer with an equal quantity of water, also for large plates, so that the development does not proceed too rapidly and can be properly controlled.

If negatives of less contrast are desired, use less hydrochinon and more metol.

SEED.

No. 1.

Metol	30 grains.
Hydrochinon	30 "
Sodium sulphite (crystals)	240 "
Water	16 ounces.

No. 2.

Potassium carbonate	120 grains.
Water	10 ounces.

To develop, take 1 ounce No. 1, 1 ounce of No. 2, and 1 ounce of water.

HYDROMETER TEST.

No. 1.

Sodium sulphite solution test 10, take	16 ounces.
Metol	30 grains.
Hydrochinon	" "

No. 2.

Potassium Carbonate Solution, Test 10.

To develop, take:

No. 1	1 ounce.
No. 2	1 "
Water	1 "

By taking equal parts of No. 1 and 2 without water, and adding 5 to 10 drops to the ounce of a 10 per cent. potassium bromide solution, this developer can be used for black tones on lantern slides and transparency plates.

METOL-BICARBONATE.

CRAMER.

Thoroughly dissolve

Metol	1 ounce.
Water	60 ounces.
Add sulphite of soda (crystals)	6 "
Bicarbonate of soda	3 "

To prepare with hydrometer, mix

Sulphite of soda solution (testing 75)..... 30 ounces.
Bicarbonate of soda solution (testing 50)..... 30 "
Metol (dissolved in 12 ounces of water)..... 1 ounce.

This developer has excellent keeping qualities, works very uniformly, and can be used repeatedly, without difference in the results. The bicarbonate of soda being a very mild alkali, it is not liable to injure the film or fog the plate.

AMIDOL.

Sodium sulphite (crystals)..... 120 grains.
Amidol..... 20 "
Water..... 10 ounces.

This developer should always be used fresh.

or:

Sulphite of soda (crystals)..... 800 grains or 52 grams.
Amidol..... 80 " " 5 "
Water..... 8 ounces " 240 ccm.

To develop, take four parts of water and one part of amidol solution.

BROMO-HYDROCHINON DEVELOPER.

CRAMER.

For producing great contrast and intensity, for developing over-exposed plates.

No. 1.

Sulphite of soda (crystals)..... 3 ounces.
Hydrochinon..... ½ ounce.
Bromide of potassium..... ¼ "
Distilled or ice-water..... 25 ounces.

Dissolve by warming and let cool before use.

No. 2.

Carbonate of soda (crystals)..... 6 ounces.
Water..... 25 "

Mix 1 and 2 equal parts, for use.

RODINAL.

HAMMER.

One part rodinal to thirty parts pure water.
Use repeatedly, adding fresh as required.

GLYCIN-PYRO.

For Transparencies, Process Plates, and Lantern Slides.

WUESTNER'S.

After having given the plate the same time of exposure as you would for iron oxalate or hydrochinon developer, place it in the following solution for half a minute:

Glycin	2 grams.
Carbonate potassium	16 "
Bromide of potassium (5 grains)	½ gram.
Water	17 ounces.

Use in quantity to suit size of plate.

For a 5 x 8 plate use 4 ounces of the above solution, and after ½ minute, before the image has made any appearance, add 1½ to 2 ounces of the following solution:

Sulphite of soda (crystals)	75 grams.
Pyrogallic acid	½ ounce.
Sulphuric acid, C. P.	5 drops.
Water	12 ounces.

and the image will appear immediately and develop quickly in beautiful roundness and extreme clearness.

It is not advisable to mix both solutions at once, as the result will not be as good as by the foregoing method, as you can control the development at will by the greater or lesser addition of pyro solution, which hastens or retards the development according to quantity used.

After development rinse the positive well and fix in an acid fixing bath. With this developer the toning of the positive is unnecessary.

The color of the picture will be the same as that of a plate which has gone through a gold bath toning solution.

With non-halation plates the development should be carried on until the high-lights become black, this is done so that the developer works through both films.

GLYCIN.

Glycin	5 parts.
Sodium sulphite	15 "
Potassium carbonate	25 "
Water	90 "

For use, dilute with 3 or 4 volumes of water.



Photographed by GEO. W. VARNEY.
Engraved by
BOSTON ENGRAVING CO.,
Boston, Mass.

STUDIO WORK.

ORTOL.

Dr. Eder's Formula.

No. 1.

Metabisulphite potassium..... 7.5 grams or 1 dram, 55 grains.
Ortol..... 15 " " 4 drams.
Water, cold.....1000 ccm. " 34 fluid ounces.

No. 2.

Crystallized sulphite of soda..... 180 grams or 5 ounces, 6 drs. 8 grains.
" soda 120 grams or 3 ounces, 6 drs., 52 grains.
Bromide of potassium.....1 to 2 grams or 15 to 30 grains.
Water..... 1000 ccm. or 34 fluid ounces.

In winter time the bromide may be omitted. For gallery work mix equal parts of 1 and 2. For landscapes mix 1 ounce each of Nos. 1 and 2, and dilute with 1 ounce of water.

FIXING BATHS FOR PLATES.

Sodium hyposulphite..... 2 ounces.
Water.....10 "

or:

Sodium hyposulphite..... 2 ounces.
Acid sulphite of soda..... ½ ounce.
Water.....10 ounces.

This bath is somewhat reducing in its action, and will be found useful in clearing muddy or stained negatives.

Climax.

Hypo.....2½ pounds.
Alum.....2 ounces.
Water.....4 quarts.

Leave the negative a few minutes longer in the bath than is required for fixing. This is important, as the permanency of the negative depends upon it. Don't use a flat tray to fix in—it causes spots and dirt; use a grooved box.

Hemperley's.

Take thirty-two ounces sulphite of soda (hydrometer test 60), add to this one ounce sulphuric acid very slowly, and eight ounces solution of chrome alum (hydrometer test 60), then add the whole to two gallons saturated solution of hypo, and it is ready for use.

Leave the negative a few minutes longer in the bath than is required for fixing. This is important, as the permanency of the negative depends upon it. Don't use a flat tray to fix in—it causes spots and dirt; use a grooved box.

Laborie's.

Bisulphite of soda	100 grams.
Hyposulphite of soda	150 "
Water	1000 ccm.

Carbutt's.

Sulphuric acid	1 dram	or	4 ccm.
Hyposulphite of soda	16 ounces	"	480 grams.
Sulphite of soda	2 "	"	60 "
Chrome alum	1 ounce	"	30 "
Warm water	64 ounces	"	1920 ccm.

Dissolve the hyposulphite of soda in 48 ounces (1440 ccm.) of water, the sulphite of soda in 6 ounces (180 ccm.) of water, mix the sulphuric acid with 2 ounces (66 ccm.) of water, and pour slowly into the sulphite of soda solution, and add to the hyposulphite; then dissolve the chrome alum in 8 ounces (240 ccm.) of water and add to the bulk of solution, and the bath is ready. This fixing bath will not discolor until after long use, and both clears up the shadows of the negative and hardens the film at the same time.

After negative is cleared of all appearance of silver bromide, wash in running water for not less than half an hour to free from any trace of hypo solution. Swab the surface with wad of wet cotton, rinse, and place in rack to dry spontaneously.

American.

Citric acid	160 grains.
Hyposulphite of soda	1 pound.
Water	32 ounces.

First dissolve the citric acid, add the hypo and allow to settle.

Cramer.

The negatives may be fixed in a plain hypo bath, 1 part hyposulphite of soda to 4 parts of water, but the following bath is especially recommended.

Prepare two solutions.

No. 1.

Hyposulphite of soda	48 ounces.
Water	96 " (3 quarts).

No. 2.

Water 32 ounces.
Add, gradually, sulphuric acid ¼ ounce.
Sulphite of sodium crystals 4 ounces.
Chrome alum 2 "

After the ingredients are dissolved, pour No. 2 solution into No. 1.

DURING THE COLD SEASON, ONE HALF THE QUANTITY OF NO. 2 IS SUFFICIENT.

This bath combines the following advantages: it remains clear after frequent use, does not discolor the negatives, forms no precipitate upon them, and hardens the gelatine to such a degree that the negatives can be washed in warm water, provided they have been left in the bath a sufficient time.

The plate should be allowed to remain in the bath five to ten minutes after the bromide of silver appears to have been dissolved. The permanency of the negative and freedom from stain as well as the hardening of the film depend upon this.

SEED.

No. 1.

Sodium hyposulphite 2 pounds.
Sodium sulphite (crystals) 4 ounces.
Water 96 "

No. 2.

Chrome alum 2 ounces.
Sulphuric acid ¼ ounce.
Water 32 ounces.

Pour No. 2 into No. 1 while stirring rapidly.

WUESTNER.

Hypo 25 ounces.
Saturated chrome alum solution 5 "
Water 100 "

This bath is good until the greenish-blue color turns brown, when a fresh bath must be made.

Acid Chrome Alum Fixing Bath.

This may be used in hot weather, and is to be mixed in the order given, then it will always work clear.

Sulphuric acid 3 drams.
Sulphite of soda 4 ounces.
Water (about) 100 "

When this is about half dissolved add hyposulphite of soda 2 pounds; after the hypo is dissolved add from 1 to 2 ounces chrome alum dissolved in 20 ounces water; then add enough water to make 160 ounces.

Another formula for preparing a highly concentrated "acid chrome alum sulphite solution" can be made up in any quantity, and added to the fixing solution—one ounce to each gallon of solution as needed—to harden the film in hot weather. Make a solution of sulphite soda in water testing 60° by the hydrometer; to each 32 ounces of this add 1 pound chrome alum; when this is dissolved add *slowly* 2 ounces sulphuric acid.

INTENSIFICATION.

Climax.

After fixing and washing thoroughly, immerse in a tray containing the following: 1 ounce each of bichloride of mercury and potassium bromide, dissolved in 32 ounces of water. Keep in motion until the film is evenly whitened, then rinse, and apply a solution of sulphite of soda, 1 ounce, to water 10 ounces.

For very slight intensity use above solutions, diluted to suit the case.

Cramer.

Prepare a saturated solution of bichloride of mercury in water and pour of this a sufficient quantity gradually into a solution of

Iodide of potassium 1¼ ounces,
Water 6 ounces,

until the point is reached, when the forming red precipitate will no longer dissolve by shaking, but be careful not to add more mercury than just enough to make the solution very *slightly* turbid. Now add

Hyposulphite of soda 1 ounce,

dissolve and add water to make 20 ounces solution.

For use, this should be diluted with about three parts of water. If the plate has not been thoroughly fixed, the intensifying solution will produce yellow stains. Be careful not to overdo the intensifying. Should it have gone too far, the negative can be reduced by placing it in the fixing bath for a short time.

Hammer.

No. 1.

Bichloride of mercury 60 grains.
Bromide of potassium 60 "
Water 6½ ounces.

No. 2.

Sulphite of sodium.....½ ounce.
Water.....4 ounces.

Place the negative in solution No. 1 until bleached; then rinse and place in solution No. 2 until entirely cleared; after which the plate must be well washed. This operation may be repeated if there is not sufficient intensity gained by first treatment.

CARBUTT.

With correct exposure and development, intensification need never be resorted to. The following formula is, however, very effective, and the most permanent of all methods:

No 1.

Bichloride mercury.....240 grains or 16 grams.
Chloride ammonia.....240 " " 16 "
Distilled water..... 20 ounces " 600 ccm.

No. 2.

Chloride ammonia..... ...240 grains or 16 grams.
Water..... 20 ounces " 600 ccm.

Let the plate to be intensified wash for at least half an hour, then lay in a 5 per cent. solution of alum for ten minutes, and again wash thoroughly; this is to insure the perfect elimination of the hypo. The least trace of yellowness after intensifying shows that the washing was not sufficient; then immerse negative in above No. 1 solution, observing that the longer it remains in the solution, the greater will be the final density. Wash well, and flow over for a few seconds the solution of ammonium chloride No. 2. Wash after this application, and immerse in dilute ammonia water (1 dram strong ammonia, in 8 ounces water) until the white image is darkened through to back of plate; or in place of the dilute ammonia, a 10 per cent. solution sulphite of soda. When darkened through, rinse well and set up to dry.

SCOLIK'S METHOD.

The fixed and well-washed negative is allowed to remain in the following mercuric chloride bath until the film is thoroughly whitened:

Mercury bichloride..... 1 part.
Potassium bromide..... 1 "
Water.....50 parts.

The bleaching being complete, the mercuric solution is rinsed off, and the negative is immersed in a mixture of equal parts of a saturated solution of sodium sulphite and water. Finally, wash well.

No. 1.

Sulphate of copper.....75 grains.
Potassium bromide.....75 "
Water..... 6½ ounces.

No. 2.

Nitrate of silver.....90 grains.
Water 4 ounces.

Place negative for ten minutes in No. 1. wash it for five minutes and immerse it in No. 2 until blackened.

REDUCTION.

Dissolve 1 part red prussiate of potash in 15 parts of water. Wrap the bottle in yellow wrapping-paper, as the solution is affected by light and will not keep long. Immerse the negative in a hypo solution—1 part hypo to 15 parts of water—to which has been added a little of the above immediately before use. When reduced sufficiently, wash thoroughly.

CLIMAX REDUCER.

To reduce a negative, it is immersed in a solution made by mixing equal parts of the following:

No. 1.

Red prussiate of potash..... 1 ounce.
Water 20 ounces.

No. 2.

Hyposulphite of soda 1 ounce.
Water 20 ounces.

Several negatives may be reduced with the same solution. If very little reduction is needed, reduce the solution by adding water. Not necessary to wash before reducing.

Cyanide Reducing Solution.

Cyanide of potassium..... ...20 grains.
Iodide of potassium.....10 "
Bichloride of mercury.....10 "
Water 10 ounces.

Reduction takes place slowly and is easy to control. After reducing, the negative should be washed thoroughly.

Another Method.

No. 1.

Hyposulphite of soda (crystals).....772 grains.
Water..... 8 ounces.

No. 2.

Ferricyanide of potassium.....76 grains.
Water..... 6 drams.

To reduce, use No. 1, 5 ounces; No. 2, 2 drams.

Another Method.

Potassium ferricyanide.....1 ounce or 30 grams.
Distilled or melted ice-water.....16 fluid ounces or 500 cc.

Keep the above solution in the dark when not in use. To reduce a negative, immerse it in hypo solution of a strength of about one ounce of hypo to a pint of water, to which a small quantity of the reducing solution has been added. To reduce locally, immerse the plate for a few minutes in water and apply the mixed solution with a camel's-hair brush to the part required. Silver stains may also be removed after wetting the plate by brushing them over with the solution. At the end, wash thoroughly. The ferricyanide solution must be added to the hypo at the time of using, as the mixed solutions do not keep.

Bartlett's Reducer.

Perchloride of iron.....30 grains.
Citric acid.....60 "
Water..... 1 pint.

Wuestner.

Saturated solution of potassium ferricyanide..... 1 part.
Sodium hyposulphite solution (1 : 5).....10 parts.

After reduction, wash the negative thoroughly.

DEVELOPMENT POINTERS.

A developer containing a surplus of alkali effects more detail in the shadows and lessens the intensity of the high-lights, which causes more softness in the negative, consequently such a developer suits well for under-exposed plates, which explains why for under-exposures a preliminary bath in a soda solution or ammonia solution is used to advantage.

A large number of developing substances, such as pyro,

eikonogen, metol, hydrochinon, and glycin, quickly intensify the high-lights, and hasten the development, so that the shadows remain far behind; therefore a modification by little over-exposure, dull lighting, or soft-working plates, is of good service.

The developer diluted with water slows the process of development, gives the shadows more of a chance to work through before the high-lights have gained their strength, prevents contrast, and therefore is recommended for contrasty plates or under-exposure.

The old or used developer acts the same as bromide, checks the development, and clears, and is used when plates are greatly over-exposed or a general fog is apparent.

The room in which plates are handled and developed must be a perfectly dark room, save for the light from a small ruby or orange-colored window (or one containing a combination of these colors), by which the progress of development can be watched. If possible, have an abundance of pure running water, and provide good ventilation. You will have better negatives and better health by so doing.

The window in your dark room which illuminates the sensitive plate during the process of development must be as non-actinic as possible. There is no such thing as a perfectly safe light. Any light of sufficient illuminating power to be of practical use will affect a very sensitive plate, if given time enough; it is therefore necessary to use great care in developing. The best and safest light for your dark-room window is a combination of ruby glass and orange paper, commonly called post-office paper. This is easier on the eyes than ruby glass alone, and by its use the quality of the negative may be more easily determined. Use a lamp or gas-jet outside to illuminate the window, as it is safer and more uniform than daylight.

A soft camel's-hair brush may be used to remove the dust from plates before placing them in the holder or dark slide. If the brushing is done hurriedly, the film will be instantly electrified and attract to itself more dust than you remove.

When plates are exposed and set away for future development, be sure to set them *face to face*, as they were in the original boxes. If the face or film is placed against the back, you will probably have finger-marks on the film, caused by the fingers coming in contact with the backs of the plates while placing them in the holder.

It is advisable to use a fresh solution of hyposulphite of sodium each day during the hot weather. The fresh solution hardens the film, and alum will not be necessary.

Thorough fixing and thorough washing, followed by quick drying, will insure permanency and fine printing quality in the negative.



Photographed by MOTES & MOORE.
Engraved by
ELECTRO-LIGHT ENGRAVING CO.,
New York.

A PRIZE WINNER.

P. A. of A. Convention, 1898.

DURING THE HOT SEASON the developer must be used more diluted and cold (by placing in ice-cold water) while, DURING THE COLD SEASON it should be stronger and moderately warm, about 70° F.

Developer, which is too strongly alkaline, or too warm, produces stain and fog.

As soon as OVER-EXPOSURE is noticed in developing, check it immediately by plentiful washing and finish with the regular developer, to which has been added bromide or old developer.

An UNDERTIMED PLATE should be treated with a fresh, diluted developer, and if sufficient detail does not appear, take the plate from the developer and, without rinsing, place it in a tray containing water, to which a little of the alkaline solution (sulphite and carbonate of soda) has been added, and leave it there as long as it increases in detail. If it is not then strong enough, the development may be continued in fresh developer.

To prevent sand or rust from striking the negatives while washing, tie a piece of cotton flannel over the faucet.

Negatives exposed to white light before the bromide of silver is thoroughly dissolved in the fixing solution will be foggy, and the printing quality will be injured.

A solution of bromide of potassium (one ounce of bromide to ten ounces of water) should be in every developing room. When plates are a little over-exposed, a few drops of this solution added to the developer will restrain its action and may thus produce a good negative from what would otherwise be a worthless plate.

DEFECTS IN NEGATIVES.

FOGGY NEGATIVES.—Caused by over-exposure; white light entering camera or dark room; too much light during development; decomposed pyro; introduction of hypo or nitrate of silver into the developing solution from the fingers or from tablets used for wet plates; developer too warm or containing too much carbonate of soda or potassium.

WEAK NEGATIVES WITH CLEAR SHADOWS.—Under-development.

TOO STRONG WITH CLEAR SHADOWS.—Under-exposure.

WEAK NEGATIVE WITH PLENTY OF DETAIL IN THE SHADOWS.—Want of intensity, caused by over-exposure. Shorter exposure with longer development will, in most cases, produce sufficient intensity, and the addition of more pyro stock solution to the developer will seldom be necessary.

FINE TRANSPARENT LINES.—Using too stiff a brush in dusting off plates.

TRANSPARENT SPOTS AND PIN-HOLES.—Dust on plate or in camera, or scum on old developer, or air bubbles while developing. Developer must be perfectly clean.

CRYSTALLIZATION ON THE NEGATIVE AND FADING OF IMAGE.—Imperfect elimination of the hypo.

YELLOW-COLORED NEGATIVES are caused by not using enough sulphite of sodium in developer, or if the article used is old and decomposed.

YELLOW STAINS are caused by using old hypo bath which has assumed a dark color, or by not leaving plate in hypo bath long enough.

MOTTLED APPEARANCE OF NEGATIVE is caused by precipitation from fixing bath containing alum, if the solution becomes old, or if it is turbid.

ORTHOCHROMATIC SENSITIZING BATHS.

VICTOR SCHUMANN.

Distilled water	200 parts.
Alcohol	10 "
Ammonia, 90°	4 "
Alcoholic solution of cyanine (1:200)	10 "

Immerse the plate in water containing a little ammonia (3 parts per 100) for two or three minutes, and then place in the above solution, drain, and dry.

MALLMAN AND SCOLIK.

Preliminary Bath.

Ammonia	2 cc.
Water	200 "

Soak the plate for two minutes.

Color Bath.

Erythrosin solution, 1 : 1000	25 cc.
Ammonia	4 "
Water	175 "

The plate should not remain longer in this bath than one and a quarter minutes. A longer time reduces the general sensitiveness.

Alcohol	500 cc.
Chinoline red	1 gram.

To which add 50 cc. of a solution of

Alcohol	500 cc.
Chinoline blue (cyanine)	1 gram.

The above solution is identical with the liquid dye sold under the name "azaline."

Bathe the plates for about two minutes by a very feeble red light in

Erythrosin solution (1 : 1000)	50 parts.
Distilled water	100 "
Silver nitrate solution (1 : 1000)	50 "
Ammonia (Sp. gr. 0.96)	2 "

Keep this solution in the dark room. These bathed plates will remain clear for about seven days.

Color Screen.

Aurantia	0.3 parts.
Warm alcohol	50 "
Ether	50 "
Pyroxiline	2 "

Dissolve the aurantia (not aurine) in the alcohol, then add the ether and pyroxiline, and filter. Coat thin polished plate glass, and attach to inner side of lens board. If not dense enough, coat again, or use two screens together. The darker the screen the longer the exposure, but the better the orthochromatic effect.

TONING FORMULAS.

Aristo-Platino Paper.

Negatives should be fully timed and slowly developed. Print to good depth. Tone first in a plain gold bath, made slightly alkaline with borax, to a point which is reached immediately after the whites have cleared up. Then wash through three changes of water, and tone in a platinum bath prepared as follows:

Stock Solution.

Water	2 ounces.
E. A. Platinite	15 grains.
Phosphoric acid (50 % sol.)	2½ drams.

To tone, take one dram of above stock solution to twenty ounces of water; if this is not strong enough to give the desired tones in six to eight minutes, add more stock solution.

Aristo Single Toner.

A toning agent giving platinum black tones on aristo-platino paper without preliminary gold toning; combining in one bath the action of the gold and platinum baths.

Printing should be very deep, tinting the high-lights. Pay no attention to the shadows. Print for the high-lights and half-tones.

Wash prints through five changes of cold water. Flatten

prints a little in first water and keep them face down during washing.

After washing, prints are ready for toning in the following bath:

Water, 30 ounces; single toner, 1 to 1½ dram.

When prints are first placed in the bath they are liable to become a muddy pink in the half-tones and show unevenness of tone. This need not cause any uneasiness. Sufficient toning will remove the muddiness and produce an even tone. Carry toning to the point where prints are clear in the high-lights and half-tones and are black in the deep shadows. Owing to the condition of water in certain localities a toning bath made according to directions will tone or bleach out the high-lights and half-tones before the shadows are toned, and if the toning is carried deep enough to obtain a black in the shadows the half-tones will be entirely destroyed. In cases of this kind a change should be made in toning bath. Instead of using all single toner use two thirds single toner and one third aristo-platinum solution. This will prevent bleaching and produce excellent tones. Never use more single toner than directions call for and never strengthen an old or exhausted bath by adding fresh stock solution; either make up the bath large enough to tone the full batch of prints or strengthen the bath when it becomes exhausted by adding aristo-platinum solution. The platinum solution may be added to bath freely without any danger of bleaching prints, but the addition of more single toner solution will cause bleaching. A very cold toning bath will not work freely. For this reason during cold weather, or at any time when water used is very cold, bath should be warmed to about 75° or 80° F.

After toning, place prints in a tray of fresh water. When all toned, give them two or more thorough changes of water and fix ten to fifteen minutes in a fixing bath, 18 hydrometer test. To make fixing bath by weight, use one ounce of hypo crystals to each twenty ounces of water. See that prints are well separated when first placed in the bath, and keep them separated during fixing.

After fixing, wash one hour in running water, or ten to twelve thorough changes if washed in a tray by hand. After final washing, mount prints with fresh starch paste in the usual way. Spread mounted prints out on a table or drying rack and allow them to become perfectly dry before taking them up.

Aristo Junior Paper.

Print until the high-lights are well tinted. Wash out all free silver by five changes of water. Tone in a plain gold bath made slightly alkaline with borax. Speed of bath six to eight minutes. Fix in a plain hypo bath, testing twelve by the hydrometer, for ten minutes.

Aristo Blue Label Paper.

Print but slightly deeper than desired when finished. Wash in five changes of warm (not hot) water. On pouring off last warm water, allow the prints to stand in cold water while waiting to be toned. Tone in any good gold bath, of such strength as to require six to eight minutes for a warm tone to be reached. As prints come from toning bath, place them in a tray of water made slightly acid with acetic acid. Fix in hypo bath, 10 to 12 hydrometer test, or one ounce of a saturated solution of hypo to every 16 or 18 ounces of water.

Albumen Paper.

Chloride of gold 1 grain.
Acetate of sodium 30 grains.
Water 8 ounces.

This must not be used till one day after preparation. It keeps well, and gives warm, rich tones.

Chloride of gold 1 grain.
Bicarbonate of sodium 4 grains.
Water 8 ounces.

This is ready for immediate use after preparation, but it will not keep.

Chloride of gold 1 grain.
Phosphate of sodium 20 grains.
Water 8 ounces.

This gives rich tones of a deep purple nature, but must be used soon after preparation.

Gold solution 10 drams.
Acetate of lime 20 grains.
Chloride of lime 1 grain.
Tepid water 20 ounces.

The "gold solution" before mentioned is prepared by neutralizing as much as is required of a one-grain solution of chloride of gold by shaking it up with a little prepared chalk, then allowing it to settle, and filtering off the clear liquid. This toning bath improves by keeping. To use, add two ounces of it to eight ounces tepid water, which will prove sufficient to tone a full-sized sheet of paper.

Chloride of gold 15 grains.
Water 5 ounces.

Neutralize with lime water, make up to fifteen ounces with water, and add two drams of chloride of calcium. This stock solution will keep for a long time. For use, dilute one ounce with ten ounces of water.

Combined Toning and Fixing Baths.

Hyposulphite of soda	3 ounces.
Nitrate of lead	60 grains.
Chloride of gold	6 "
Water	24 ounces.

GAEDICKE.

Hyposulphite of soda	200 grams.
Boric acid	30 "
Lead nitrate	15 "
Sulphocyanide of ammonium	20 "
Chloride of gold (1 : 200)	60 cc.
Water	1000 "

Chloride of gold	1 grain.
Phosphate of sodium	15 grains.
Sulphocyanide of ammonium	25 "
Hyposulphite of sodium	240 "
Water	2 ounces.

Dissolve the gold separately in a small quantity of water, and add it to the other solution.

No-Gold Combined Bath.

Hypo	6 ounces.
Washing soda	$\frac{1}{4}$ ounce.
Lead acetate	$\frac{1}{2}$ "
Water	1 quart.

BLUE PRINT FORMULAS.

No. 1.

Citrate of iron and ammonia	$1\frac{7}{8}$ ounces.
Water	8 "

No. 2.

Ferricyanide of potassium	$1\frac{1}{4}$ ounces.
Water	8 "

Mix equal parts of No. 1 and No. 2, and apply with brush or by floating for three minutes. Plain Rives paper should be used; hang up to dry in darkened room.

Black Lines upon a White Ground.

Gelatine	3 drams.
Perchloride of iron solution (U. S. Ph.)	6 "
Tartaric acid	3 "
Ferric sulphate	3 "
Water	9 ounces.

Filter off any precipitate that may be found, and coat any good, stout, white paper with the full-strength solution. Expose in sunlight till details or lines are visible, and develop with

Gallic acid	6 drams.
Alcohol	6½ ounces.
Water	32 "

Wash well in several changes of water.

The sensitizing solution is as follows:

Gum arabic	15 grams.
Tartaric acid	2 "
Chloride of sodium (common salt)	9 "
Sulphate of iron	10 "
Iron perchloride	15 "
Water	110 cc.

In mixing the solution, the gum arabic is first dissolved in the water by the aid of heat, and the other salts are added while the solution is still warm.

The solution is spread over the surface of the paper with a sponge, and, after allowing a little time for it to penetrate the surface, all superfluous moisture is removed, using the sponge again, well wrung out. If this precaution be not attended to, the depth of the lines is not equal. The paper is then dried as quickly as possible. If the drying is not rapid the whites stain.

Exposure is somewhat longer than would be needed with sensitized albumenized paper. The color of the sensitized paper is yellow. During exposure all but the lines turn to white.

Development is by a plain aqueous solution of gallic acid, the strength of which is not important. Care must be taken not to leave the print too long in the developer, otherwise staining will result. After development the print is rapidly washed, when superfluous moisture is carefully sponged off the surface. If this precaution be not observed, inequality in the depth of the lines will result.

MOUNTANTS.

Best thin glue	3 ounces.
Golden syrup	¼ ounce.
Alcohol	3 ounces.
Water	3 "

Soften the glue in 2 ounces of the water; heat gently in a pan of hot water, add the syrup (refined molasses), add the other ounce of water to the alcohol and pour into the jar under constant stirring.

JARECKI'S.

A.

Wheat flour.....3½ ounces.
Water.....8 "

B.

Salicylic acid.....15 grains.
Water.....12 ounces.

Stir the flour with the eight ounces of water. Boil the other twelve, add the salicylic acid and stir in *A*.

Non-Cockling Paste.

Nelson's No. 1 gelatine..... 4 ounces.
Water.....16 "
Glycerine..... 1 ounce.
Alcohol..... 5 ounces.

Dissolve the gelatine in the water, then add the glycerine, and then the alcohol.

MISCELLANEOUS FORMULAS.

COL. J. WATERHOUSE'S DEVELOPER FOR PRODUCING REVERSED NEGATIVES.

A.

Lithium carbonate sal. sol.....1 ounce.
Eikonogen.....5 grains.
Sodium sulphite.....5 "

Dissolve the two latter in the first just before using it and add a few drops of

B.

Ammonium bromide.....1 part.
Thiocarbamide.....3 parts.

Dissolve in water.

To Clean Negatives Stained by Silver.

Take a plug of cotton-wool and wet it well with a weak solution of cyanide of potassium; rub gently all over the negative, using a little more force on the stained parts. Wash well. Dry



Photographed by GEO. SMITH.
Engraved by
ALBANY ENGRAVING CO.,
Albany, N. Y.

A CONVENTION PRIZE WINNER.

P. A. of A., 1898.



on blotting-paper. If necessary to revarnish, flood the plate once or twice with methylated spirit. Let dry, and then varnish in the ordinary way.

To Remove Yellow Stain Caused by Developer.

Sulphate of iron	3 ounces	or	90 grams.
Sulphuric acid	1 ounce	"	30 ccm.
Alum	1 "	"	30 "
Water	20 ounces	"	600 "

If, after developing and fixing your negative, it is found to be stained yellow from the pyro or hydrochinon developer, first wash well to remove all hyposulphite, then immerse in above solution until the stain is removed; again wash well and dry.

To Remove Silver Stains from Negatives.

Iodine	5 grains.
Potassium iodide	20 "
Water	½ ounce.

When the iodine is dissolved add, while stirring, a few drops of a strong solution of hypo until solution becomes colorless. Apply to the spot with the soft end of a finger or a tuft of absorbent cotton, rubbing gently. Rinse well and dry.

Soaking Solution for Films.

BLAIR.

Water	16 ounces.
Alcohol	4 ounces.
Glycerine	½ ounce.

EASTMAN.

Glycerine	1 ounce.
Water	32 ounces.

To Strip Film from Ordinary Plates.

Give negatives two coats of 2 per cent. collodion. The following formula yields good results:

Negative cotton	30 grains or 2 grams.
Ether	1 ounce, 6 dr. or 50 cc.
Alcohol	1 " " " "

Allow the first coat to dry before applying the second, and when second coating has set, place immediately in cold water until greasiness has disappeared, then place in a bath of

Sodium fluoride (com.).....5 drams or 20 grams.
Water.....5 ounces " 160 cc.

When thoroughly saturated with this solution, which will take at least an hour, place without washing in

Sulphuric acid.....1 dram or 4 cc.
Water.....7 ounces " 196 cc.

Rubber trays should be used for this and the fluoride bath. When film begins to loosen, lay a piece of writing paper or celluloid upon it as a support, and separate the two from the glass. After washing well under tap it can be transferred to a permanent support.

The following will answer the purpose: coat a clean glass plate which has been rubbed with French chalk and dusted, with

Gelatine 2½ ounces or 75 grams.
Glycerine..... 3 drams " 10 cc.
Water.....16 ounces " 500 cc.

Filter before coating through canton flannel and avoid air bubbles. Coat on a levelling stand as thick as the plate will hold; allow to set and dry.

Clearing Solution.

Powdered alum.....60 grains.
Sulphuric acid.....60 minims.
Water.....20 ounces.

A Substitute for Varnishing.

Alum 2 ounces.
Tannic acid..... 1 dram.
Water.....16 ounces.

Immerse negative for from three to five minutes; too long an immersion will loosen the film. Films so treated are almost waterproof.

Varnish for Celluloid Films.

Powdered amber..... 5 parts.
Chloroform.....45 "
Coal-tar benzine.....45 "
Gum dammar..... 7½ "

The mixture should be allowed to stand in a warm place for some time and should be decanted twice before using.

Ground Glass Varnish.

Sandarac 90 grains.
Mastic 20 "
Ether 2 ounces.
Benzole ½ to 1½ "

The proportion of the benzole added determines the grain of the matt obtained.

Retouching Varnishes.

Sandarac 1 ounce.
Castor oil 80 grains.
Alcohol 6 ounces.

First dissolve the sandarac in the alcohol, and then add the oil.

Copaivic acid ¼ gram.
Dammar ½ "
Ether (strongest) 50 cc.
Gasoline 120 "

Dry the dammar by heating until melted. When quite cold, powder, and dissolve in the ether. Then add the copaivic acid and finally add the mixture to the gasoline.

Gum dammar 1 part.
Oil of turpentine 5 parts.

Strong solution of gum myrrh in oil of turpentine.

Negative Varnishes.

Sandarac 4 ounces.
Alcohol 28 "
Oil of lavender 3 "

Bleached shellac 1¼ ounces.
Mastic ¼ ounce.
Oil of turpentine ¼ "
Sandarac 1¼ ounces.
Alcohol 20 fluid ounces.

Silvering Mirrors.

The glass plate to be silvered must be absolutely clean.

A. Silver nitrate 175 grains.
Distilled water 10 ounces.
B. Nitrate of ammonium 262 grains.
Distilled water 10 ounces.
C. Pure caustic potash 1 ounce (avoir.).
Distilled water 10 ounces.
D. Pure sugar candy ½ ounce.
Distilled water 5 ounces.
Dissolve and add
Tartaric acid 50 grains.

Boil in a flask for ten minutes, and when cool, add

Alcohol	1 ounce.
Distilled water to make	10 ounces.

For use, take equal parts of A and B. Mix together also equal parts of C and D, and mix in another graduate. Then mix both together in the silvering vessel and suspend the mirror face down in the solution.

Coloring Photographs.

The finely powdered colors are mixed with the following:

Filtered albumen	100 cc.
Ammonium carbonate	5 grains.
Glycerine	3 cc.
Liquid ammonia	4 "
Water	25 "

Black for Woodwork.

Shellac	40 parts.
Borax	20 "
Glycerine	20 "
Water	500 "

After dissolving add 50 parts aniline, black.

For Writing on Glass.

Bleached shellac	2 parts.
Venice turpentine	1 part.
Oil of turpentine	3 parts.
Lampblack	1 part.

Warm the first three ingredients together over a water-bath, and then stir in the lampblack, incorporating thoroughly.

Printing on Silk.

Wash the silk in warm water and float for two minutes on the following solution:

Salt	10 grains.
Ammonium chloride	10 "
Ammonia	15 drops.
Water	1 ounce.

Then hang the silk up to dry. Sensitize in

Silver nitrate	150 grains.
Water	1 ounce.

After floating on this for two minutes, dry, print deeply, and tone in ordinary manner.

Test for Hypo in Wash Water.

Permanganate of potash..... 3 grains.
Caustic soda.....15 "
Water.....16 ounces.

A few drops of the water to be tested are mixed with a few drops of this solution. If hypo is present, the red color will change to green.

Varnish for Plate Holders and Camera Interiors.

Bleached shellac..... 5 ounces.
Borax..... 1 ounce.
Water.....20 ounces.

Digest at nearly boiling point until dissolved; filter through muslin.

Shellac..... 4 ounces.
Borax..... 1 ounce.
Glycerine..... ½ ounce.
Aniline black..... 2 ounces.
Water.....20 "

Comparative Strength of Various Lights.

Gas flame	1
Oxy-hydrogen light	11
Magnesium ribbon	58
Diffused daylight	268
Electric light	5179
Sunlight	16079

Color Screen.

Saturated alcoholic solution of "brilliant yellow"..... 4 ounces.
Pyroxyline.....40 grains.
Ether..... 4 ounces.

Process Formulas.

Collodion.

Alcohol	8 ounces.
Ether	10 "
Cadmium iodide	52 grains.
Ammonium iodide	32 "
Strontium chloride	10 "
Calcium chloride	10 "
E. A. red label cotton	80 "

Developer.

Protosulphate of iron solution	hydrometer test 20°.
Acetic acid	1 ounce to 16 ounces of iron solution.
Alcohol	sufficient to make developer flow smoothly.

Intensifier.

Copper sulphate	1 ounce.
Potassium bromide	¼ "
Water	16 ounces.

Clearing solution, nitric acid 1, to 10 water. Black with silver nitrate solution, hydrometer 20°.

COPYING COLLODION.

For Line Work.

Ether and alcohol, equal parts.

Anthony's snowy cotton	6 grains to 1 ounce.
Brown iodide of ammonium	4 " " "
Bromide of cadmium	1 grain " "

ENAMEL SOLUTIONS.

Clarified fish glue	1 ounce.
Pure gum arabic	1 "
Albumen	1 "
White rock candy	¼ "
Ammonium bichromate	½ "
Aqua ammonia	20 drops.
Water	6 ounces.

No. 1.

LePage's glue	3 ounces.
Albumen	1 ounce.
Ammonium bichromate	80 grains.
Water	4 ounces.

No. 2.

Gum acacia	½ ounce.
Aqua ammonia	¼ "
Water	8 ounces.

No. 2. solution will keep; No. 1 will not. For use, mix 3 ounces of No. 1 with 1 ounce of No. 2.

Fish glue	2 ounces.
White of egg	1 ounce.
Ammonium bichromate	60 grains.
Chromic acid	10 "
Liquid ammonia	¼ ounce.
Water	2 ounces.

Fish glue (Le Page's clarified)	1 ounce.
White of egg	1 "
Ammonium bichromate	30 grains.
Water	1 ounce.

Etching Solution.

Saturated solution common alum	40 ounces.
Nitric acid	1 ounce.

Albumen Sensitizing Solution.

White of two eggs (beat to a froth with an egg-beater).

Water	8 ounces.
Ammonium bichromate	30 grains.
Water	8 ounces.

Allow to stand over night and filter before using.

FOR ETCHING ON STEEL.

Spencer Acid.

No. 1.

Nitric acid	5 ounces.
Water (distilled)	5 "
Pure metallic silver	1 ounce.

No. 2.

Nitric acid, C. P.	5 ounces.
Water (distilled)	5 "
Quicksilver	1 ounce.

The two solutions are made in separate vessels, and then mixed and kept in a glass-stoppered bottle. This mordant can be diluted with water, and thus the intensity of its action can be regulated. A strip of zinc, bent so as to touch a bared portion of the steel at one end and the Spencer acid at the other, is used to establish a galvanic action and start the action of the acid.

ARTOTYPE FORMULAS.

Coat clean glass with

Albumen	150 grams.
Potassium bichromate	3 "

Dry in oven at 110 degrees Fahr. Lay face down on black velvet and expose to light until albumen is insoluble. Coat with following:

Gelatine (soft)	160 grams.
Ammonium bichromate	30 "
Water	2400 cc.

Dry again at 110 degrees Fahr., and coat with:

A.

Gelatine	75 grams.
Water	1000 cc.

B.

Isinglass	75 grams.
Ammonium bichromate	18 "
Water	1000 cc.

C.

Chrome alum	10 grams.
Potassium bicarbonate	2 "
Water	2000 cc.

Mix *A* and *B* and to each 100 cc. add 2 cc. of *C*. Dry the plate as before. Expose in shade under negative for ten minutes. Immerse in water until colorless, wipe off with sponge and print in a lithographic press.

A Substitute for Asphaltum.

Gum turmeric has been suggested as a substitute for asphaltum, the following being the formula:

Chinese turmeric	10 parts.
Alcohol	100 "
Oil of lavender	5 "
Methyl violet, saturated solution in alcohol	2 "

DEVELOPER FOR "CLIMAX" PROCESS PLATES.

The following formula is an old and well-tried one with these plates, and will be found to give, with properly exposed plates, negatives that are of such character as to be ready for use without intensification:



Photographed by VERNON ROYLE.
Engraved by
COLORITYPE CO.,
New York, N. Y.

ON DIAMOND BROOK, NEAR PATERSON, N. J.

No. 1.

Sulphite of soda..... 4 ounces.
Pyro..... 1 ounce.
Sulphuric acid.....15 drops.
Water.....20 ounces.

No. 2.

Carbonate of soda (gran.)..... 4 ounces.
Water.....20 "

In order to get density, a smaller proportion of alkali is used, and the mixture we have found to answer best for line negatives is No. 1, 1 ounce; No. 2, ½ ounce; water 1½ ounces, and ¼ of a dram of a 12-grains-to-the-ounce solution of potassium bromide. The image should develop slowly, and should be under control. However, the plate will not fog under any circumstances in this developer.

After development, wash in water, and fix in the usual solution of hyposulphite of soda. If the developer is used repeatedly, it will be found necessary to clear the plates with a mixture of hydrochloric acid, ½ ounce; water, 20 ounces. For half-tone work the prism is almost universally used, thus dispensing with the stripping of the film. The addition of the prism increases the exposure about ten to fifteen seconds, but when one remembers that the stripping of the film is dispensed with, this is by no means an obstacle.

CARBUTT'S DEVELOPER FOR PROCESS PLATES.

Developing Formula for Half-Tone (Screen) and Negatives of Pen Drawings.

No. 1.

Neutral oxalate of potash..... 1 pound.
Warm water (free from lime salts).....48 ounces.

Add of a strong solution of citric acid enough to just turn litmus paper red.

No. 2.

Sulphate of iron..... ½ pound.
Sulphuric acid.....15 drops.
Warm water.....24 ounces.

No. 3—*Restrainer.*

Potassium bromide..... ½ ounce.
Water.....10 ounces.

To develop, to 5 ounces No. 1 add 1 ounce No. 2 and 10 drops No. 3.

To get an evenly developed plate, use sufficient developer to well cover the plate, allow to act until, on looking through, the image appears quite dense; then wash and place in clearing bath one or two minutes.

No. 4—*Clearing Bath.*

Alum	1 ounce.
Citric acid	½ "
Water	20 ounces.

Again wash and immerse in fixing bath.

No. 5—*Fixing Bath.*

Sulphite of soda	2 ounces.
Water	6 "
Sulphuric acid	1 dram.
Water	2 ounces.
Hyposulphite of soda	1 pound.
Water	48 ounces.
Chrome alum	1 ounce.
Water	8 ounces.

Dissolve in the order given, add the solution of sulphuric acid to the sulphite of soda, add this to the hyposulphite, and finally add the solution of chrome alum.

No. 6—*Reducing Solution.*

Ferricyanide of potassium	50 grains.
Water	10 ounces.

No. 7—*Bleaching Solution.*

A.

Bichloride of mercury	240 grains.
Chloride of ammonium	240 "
Distilled water	20 ounces.

No. 7—*Sulphite of Soda Solution.*

B.

Sulphite soda	1 ounce.
Water	9 ounces.

Line Drawings from Photographs.

Sensitize Clemon's matt salted paper with a 40-grain-to-the-ounce bath of silver nitrate. Print under negative and fix in hypo bath, 1 : 6. Wash well, mount, and draw on the print with waterproof India ink. Bleach out the photographic image with

Bichloride of mercury	1 ounce.
Water	5 ounces.

To Clean Glass.

Make up the following mixture:

Powdered pumice stone	1 ounce.
Powdered chalk	1½ ounces.
Ammonia	½ ounce.
Water	1 "

Apply with a piece of wash leather, and polish with a piece of rag or soft paper.

Lemercier Lithographic Drawing Ink.

Yellow wax	4 parts.
Tallow (mutton)	4 "
Marseilles soap	12 "
Shellac	6 "
Lampblack	1 part.

Boil together. Grind, when cold, with water. It should flow like writing-ink from the pen.

Lead Intensifier for Line Negatives.

After developing and washing, place the negative in a tray containing:

Red prussiate potash	2 ounces.
Nitrate of lead	1¼ "
Water	24 "

Allow to remain until the film turns white, remove and wash five minutes in running water and blacken with:

Ammonium sulphuret	1 ounce.
Water	4 ounces.

Allow to act until it has penetrated the film, which is determined by examining back of plate; wash and clear with:

Nitric acid	1 dram.
Water	4 ounces.

GELATINE SOLUTION FOR STRIPPING FILM.

Sheet gelatine	1 ounce.
Glycerine	¼ "
Water	9 ounces.

made in quantities to suit convenience.

Soak gelatine half an hour, and melt at a temperature of 110°; strain through double thickness of cheese cloth. The negative to be coated must be placed on a three-point levelling stand; an extemporaneous one can be made by inserting in a bench or table three long screw eyes, so placed as to form a triangle, placing a glass on them, and, by the aid of a small spirit level, bring the surface to a true level.

PYRO DEVELOPER FOR STRIPPING PLATES.

CARBUTT'S.

No. 1 Pyro Stock Solution.

Distilled or ice water..... 10 ounces. or 300 ccm.
Oxalic acid..... 1 dram. " 4 "

Then add Schering's or Merck's Pyro, 1 ounce (30 grams), and water to make 16 fluid ounces (480 ccm.).

No. 2 Soda Stock Solution.

Soda sulphite crystals..... 4 ounces or 120 grams.
Soda carb. crys. (or dry gran., 1 ounce).. 2 " " 60 "
Potash carbonate..... 1 ounce " 30 "
Water..... 10 ounces " 300 ccm.

Dissolve, and add water to make measure 16 fluid ounces (480 ccm).

No. 3 Bromide Solution.

Bromide of sodium or potassium..... ½ ounce (14 grams).
Water..... 5 ounces (150 ccm).

Pyro Developer.

Dilute 2 parts of stock No. 2 with 7 parts of water for cold weather, and 10 to 12 of water in summer. To three ounces of dilute No. 2 add 1½ to 2½ drams (6 to 10 ccm.) of No. 1. The more pyro the denser the negative, and *vice versa*. No yellowing or fogging need be apprehended if directions are followed. Development should be continued until the image seems almost buried, then wash, and place in fixing bath. N. B.—A few drops of bromide, say 8 to 12 drops, to the above is recommended.

For *instantaneous exposures* take for a 5 x 8 or 6½ x 8½ plate three ounces of dilute No. 2. Lay the plate to soak in this, and cover pan. Put 2 drams of No. 1 into the graduate, and 2 drops of bromide solution. Pour the soda solution off of the plate into the pyro and back over the plate; let development proceed, and examine occasionally. Keep solution in gentle motion over the plate. A *very* short exposure may take ten minutes to fully develop. If the image is not fully brought out this time, add to developer in pan three times its bulk of water, and let plate lie in it covered over half an hour or more if necessary, until full development is attained, then wash, and proceed as directed under head of developer.

DIRECTIONS FOR PHOTOGRAPHING A BLUE PRINT ON ROSS'S STIPPLE PAPERS.

Make a bath of
Chrome alum..... ½ ounce
Water..... 1 quart.

Pour into a tray large enough to accommodate your paper. Lay in the sheet perfectly flat, allow it to remain about three minutes, remove and hang up by the corners to dry. This makes the paper semi-water proof, and it may be washed long enough for ordinary photo-prints.

To sensitize, coat the paper with the following solution :

Citrate of iron and ammonia..... ½ ounce.
Water.....4 ounces,

using cotton to apply ; then hang up in the dark room to dry. Print under the negative until the darkest portion of the design appears, which is enough for an outline to follow in drawing.

Develop with :

Red prussiate potash.....10 grains.
Water.....10 ounces.

Put in a tray and float about one half minute until you see the design develop ; wash well and dry.

Amateur Photographic Societies.

UNITED STATES.

AGASSIZ ASSOCIATION, MANHATTAN CHAPTER.—Established 1881. Headquarters, 141 East 40th St , N. Y. Annual meeting, January. *President*, C. F. Groth ; *Vice-President*, C. Kromm ; *Corresponding Secretary*, E. B. Miller ; *Treasurer*, W. S. Miller.

ALBANY CAMERA CLUB, ALBANY, N. Y.—Established 1887. Headquarters, 72 Chapel Street. Annual meeting, first Friday in April. *President*, W. W. Byington ; *Vice-President*, Dr. Samuel B. Ward ; *Secretary*, Chas. B. Tillinghast ; *Treasurer*, Dr. Frank W. Cady.

AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established December 29, 1887. Headquarters, Selma, Dallas County, Alabama. Annual meeting, first Tuesday in January. *President*, William S. Monk ; *Secretary-Treasurer*, S. Orlando Trippe.

AMERICAN INSTITUTE PHOTOGRAPHICAL SECTION, NEW YORK CITY.—Established 1859. Headquarters, 111–115 West 38th Street. Annual meeting, first Thursday in February. *President*, Oscar G. Mason ; *Vice-President*, Robert A. B. Dayton ; *Secretary*, J. W. Bartlett, M.D., 149 West 94th Street ; *Treasurer*, William H. Oakley.

AMERICAN LANTERN SLIDE INTERCHANGE.—Established 1885. Headquarters, 361 Broadway, N. Y. Annual meeting, November 15th, of each year. *General Manager*, F. C. Beach. *Board of Managers*, F. C. Beach, W. H. Rau, Geo. Timmins, W. H. Cheny, John S. Paterson.

ASSOCIATION CAMERA CLUB, CLEVELAND, OHIO.—Established 1897. Headquarters, Y. M. C. A. Annual meeting, April. *President*, W. F. Kenyon ; *Vice-President*, A. J. Gaehs ; *Secretary* and *Treasurer*, J. B. Buckley.

ATLANTIC CITY PHOTOGRAPHIC SOCIETY, ATLANTIC CITY, N. J. —Established 1896. Headquarters, Mensing Building, 1313 Atlantic Avenue. Annual meeting, first Friday in February. *President*, Herbert N. Morse ; *Vice-President*, Ferd. Stodler, Jr.; *Secretary*, Hubert Somers ; *Treasurer*, Leonard D. Algar.

BOSTON CAMERA CLUB.—Established 1881. Reorganized 1886. Headquarters, 50 Bromfield Street, Boston, Mass. Annual meeting, first Monday in January. *President*, Joseph Prince Loud ; *Vice-Presidents*, William O. Witherell, Charles H. Currier, Charles Sprague ; *Secretary*, Chas. Hall Perry ; *Treasurer*, Charles H. Chandler.

BOYS' HIGH SCHOOL CAMERA CLUB OF BROOKLYN, N. Y.—Established 1893. Headquarters, Brooklyn Boys' High School. Annual meeting, first Monday in October. *President*, Howard C. Blackwell ; *Vice-President*, H. S. Wright ; *Recording Secretary*, W. C. Stevenson ; *Corresponding Secretary*, H. C. Turner ; *Treasurer*, N. D. Campbell.

BROCKTON CAMERA CLUB, BROCKTON, MASS.—Established April, 894. Headquarters, Room 1, Smith Building. Annual meeting, third Friday in April. *President*, Robt. E. Brayton; *Vice-Presidents*, A. L. Evans, J. S. Thorndike; *Secretary*, Edgar W. Farwell; *Treasurer*, Chas. L. Perry.

BROOKLYN ACADEMY OF PHOTOGRAPHY.—Incorporated February, 1887. Headquarters, 177 Montague Street, Brooklyn, N. Y. Annual meeting, first Tuesday in June. *President* H. B. Fullerton; *First Vice-President*, Samuel Baron; *Second Vice-President*, F. M. Lawrence; *Corresponding Secretary*, Wm. B. Dudley; *Recording Secretary*, Wm. Arnold; *Treasurer*, Wm. T. Wintringham; *Librarian and Curator*, Sherman Esselstyn.

BUFFALO CAMERA CLUB, BUFFALO, N. Y.—Headquarters, 611 Main Street. Annual meeting, October 1, 1898. *President*, John A. Stein; *Vice-President*, C. L. Baer; *Secretary*, Thad. W. Gardiner; *Treasurer*, Everett Tooley.

CALIFORNIA CAMERA CLUB.—Incorporated April 5th, 1890. Headquarters, Academy of Sciences Building, San Francisco. Annual meeting, first Tuesday after first Monday in April. *President*, James W. Erwin; *Vice-Presidents*, W. E. Goodrum and E. J. Dollard; *Secretary*, H. B. Hosmer; *Treasurer*, Dr. E. G. Eisen.

"CAMERADS," NEW BRUNSWICK, N. J.—*Secretary*, Harvey Iredell, D.D.S.; *Treasurer*, Chas. V. Myers.

CAMERA CLUB OF NEWARK, DELAWARE.—Established 1893. Headquarters, Delaware College. Annual meeting, May. *President*, F. D. Chester; *Vice-President*, Prof. G. A. Powell; *Secretary*, F. Wm. Curtis.

CAPITAL CAMERA CLUB OF WASHINGTON, D. C.—Organized May 1, 1891. Rooms, 1010 F Street, N. W. *President*, George W. White; *Vice-President*, Wallace C. Babcock; *Secretary*, Charles E. Fairman, 511 Eleventh Street, N. W.; *Treasurer*, William P. Herbst; *Librarian*, William F. Peabody. Active members, 100. Honorary members, 7.

CENTRAL CAMERA CLUB OF THE YOUNG MEN'S CHRISTIAN ASSOCIATION, BROOKLYN, N. Y.—Established January, 1888. Headquarters, 502 Fulton Street, Brooklyn, N. Y. Annual meeting, first Monday in January. *President*, Wm. H. Lowery; *Vice-President*, James P. Allen; *Secretary*, Edwd. L. Damon; *Treasurer*, Chas. Kirhn.

CHAUTAUQUA PHOTOGRAPHIC EXCHANGE CLUB.—Established 1888. (Correspondence.) *President*, C. M. Fitzgerald, of California; *Secretary* and *Treasurer*, Mrs. C. L. Pierce, "Elmhurst," Riverside, Conn.

CHICAGO SOCIETY OF AMATEUR PHOTOGRAPHERS, CHICAGO, ILL.—Established December, 1886. Headquarters, The Art Institute. Annual meeting, second Wednesday in January. *President*, Marshall Wait; *Vice-President*, Winfield S. Bosley; *Secretary*, Frank F. Gaylord; *Treasurer*, Frank W. Smith.

COLUMBIA PHOTOGRAPHIC SOCIETY, PHILADELPHIA, PA. Organized December 7, 1889. Incorporated June 29, 1894. Headquarters, 1811 N. Broad Street, Philadelphia, Pa. Annual meeting, first Monday in February. *President*, Dr. G. J. R. Miller; *First Vice-President*, P. A. Mitchell; *Second Vice-President*, Frank E. Gartley; *Secretary*, John Curtis; *Treasurer*, John S. Newman. Official organ, *The Camera*.

COLUMBIAN AMATEUR PHOTO. EXCHANGE. — Established 1893. *President*, A. H. Waite, Tacoma, Washington ; *Secretary* and *Treasurer*, W. E. Dickinson, Bradford, Ia.

COOPERSTOWN CAMERA CLUB, COOPERSTOWN, N. Y.—Established January 1, 1898. Headquarters, Republican Block, Main Street. Annual meeting, January 1st. *President*, M. A. Caulkins ; *Vice-President*, Homer L. Hunter ; *Secretary* and *Treasurer*, Fred L. Peck.

CORLISS ART AND CAMERA CLUB, NEWBURYPORT, MASS. Established 1895. Headquarters, cor. State and Harris Streets. Annual meeting, first Friday in April. *President*, John H. Wheeler ; *Vice-President*, Fred. G. Nicklas ; *Corresponding Secretary*, Otis P. Gould ; *Recording Secretary*, E. F. Noyes ; *Treasurer*, E. F. Noyes.

CORTLAND CAMERA CLUB, CORTLAND, N. Y.—Established 1895. Headquarters, Y. M. C. A. Annual meeting, December 1st. *President*, Jno. Orr : *Vice-President*, C. C. Darby ; *Secretary* and *Treasurer*, L. M. Alexander.

DAGUERRE CAMERA CLUB, NEW YORK CITY.—Established 1894. Headquarters, members' houses. Annual meeting, December 27, 1898. *President*, Geo. King ; *Vice-President*, H. J. Smith : *Secretary*, J. W. Flynn, M.D., 116 East 81st Street ; *Treasurer*, Carl G. Stulpuagel.

DETROIT CAMERA CLUB, DETROIT, MICH.—Established February 11, 1897. Place of meeting, Detroit Museum of Art. Annual meeting, first meeting in January. *President*, E. Donald Roberts : *Vice-President*, Mrs. Geo. O. Pratt ; *Secretary* and *Treasurer*, Geo. O. Pratt, 720 Antoine Street, Detroit, Mich.

ELIZABETH CAMERA CLUB, ELIZABETH, N. J.—Established 1893. Headquarters, 96 Broad Street. Annual meeting, first Saturday in May. *President*, D. R. Blackford : *Vice-President*, H. O. Halsey ; *Secretary*, E. R. French ; *Treasurer*, Jas. A. Knowles.

ERIE CAMERA CLUB, ERIE, PA.—Established May, 1894. Headquarters, Room No. 30, Downing Building. Annual meeting, third Thursday of January *President*, Frank W. Grant ; *Vice-President*, Jas. M. Force ; *Secretary*, B. P. Beckers ; *Treasurer*, Robert Smith.

GLENS FALLS CAMERA CLUB, GLENS FALLS, N. Y.—Established 1896. Headquarters, Glens Falls, N. Y. Annual meeting, October. *President*, W. E. Baldwin ; *Vice-President*, Miss Bertha Wait ; *Secretary*, Wm. Cowlbeck ; *Treasurer*, A. E. Mason ; *Chairman Lantern Slide Committee*, O. A. Brower.

HAVERHILL CAMERA CLUB, HAVERHILL, MASS.—Established February 8, 1898. Headquarters, rear of How Street. Annual meeting, second Tuesday of June, *President*, Wm. H. Curtis ; *Vice-President*, Chas. W. Glines ; *Secretary* and *Treasurer*, Alfred E. Collins.

ILLINOIS COLLEGE OF PHOTOGRAPHY, EFFINGHAM, ILL.—Established 1894. *President*, L. H. Bissell ; *Vice-President*, W. B. Dennis, Sr. ; *Secretary*, Felix A. Roymer ; *Treasurer*, Henry Eversman.

INTERNATIONAL PHOTO PRINT EXCHANGE.—Established May, 1893. Headquarters, Beach Bluff, Mass. A postal photographic exchange club of 20 members. *Secretary* and *Treasurer*, Walter Sprange.



Photographed by RÖSCH, St Louis.
Engraved by
ILLINOIS ENGRAVING CO.,
Chicago, Ill.

STUDIO WORK.



LANCASTER CAMERA CLUB, LANCASTER, PA.—Established May 5, 1895. Headquarters, cor. Orange and N. Queen Streets, third floor. Annual meeting, first Friday in May. *President*, Wm. S. Gleim; *Vice-President*, Wm. A. Heitshu; *Secretary* and *Treasurer*, F. A. Demuth.

LANCASTER Y. M. C. A. CAMERA CLUB, LANCASTER, PA.—Established May 4, 1898. Headquarters, Y. M. C. A. Building, Lancaster, Pa. Annual meeting, second Tuesday of April. *President*, M. Aha Zook; *Vice-President*, A. E. Stauffer; *Secretary*, John S. Cochran; *Treasurer*, W. W. Heidelbaugh; *Librarian*, B. R. Maxwell.

LOWELL CAMERA CLUB, LOWELL, MASS.—Established 1889. Incorporated 1892. Headquarters, Central Block. Annual meeting, first Tuesday in March. *President*, Paul Butler; *Vice-Presidents*, W. P. Atwood, F. T. Walsh; *Secretary*, George A. Nelson, 305 Summer Street; *Treasurer*, M. A. Taylor.

MALDEN Y. M. C. A. CAMERA CLUB, MALDEN, MASS.—Established January 16, 1895. Headquarters, Y. M. C. A. Building. Annual meeting, first Wednesday in January of each year. *President*, J. Arthur Came; *Vice-President*, F. G. Stetson; *Secretary*, Ashley M. Hoyt.

MATTAPAN CAMERA CLUB, MATTAPAN, MASS.—Established May, 1890. Headquarters, Brush Hill Road, Milton, Mass. Annual meeting, May. *President*, John A. Locklin; *Vice-President* and *Secretary*, Erdmann Sonnenbrodt, address, Box 83, Mattapan, Mass.; *Treasurer*, Walter Hertzberg.

MINNEAPOLIS CAMERA CLUB.—Established 1892. Annual meeting, April. *President*, H. E. Murdock; *Vice-President*, W. H. McMullen; *Secretary*, C. J. Hibbard, 317 Hennepin Avenue; *Treasurer*, John F. Schlimme.

MOBILE CAMERA CLUB, MOBILE, ALA.—Established February 1, 1898. Headquarters, rooms in Turner Hall. Annual meeting, second Friday in January. *President*, Dr. Wm. B. Pape; *Vice-President*, Hugh Rolston; *Secretary* and *Treasurer*, Richard Hines, Jr.

MYSTIC CAMERA CLUB, MEDFORD, MASS.—Established June 4, 1889. Headquarters, 2 Ashland Street. Annual meeting, first Tuesday in January. *President*, Will. C. Eddy; *Vice-President*, L. E. Shattuck; *Secretary*, George W. Prowse; *Treasurer*, Charles A. Clark.

NORFOLK CAMERA CLUB, NORFOLK, VA.—Established 1897 December. *President*, Dr. Randall Barrett; *Vice-President* Walter Taylor, Jr. *Secretary*, C. R. MacKimmer; *Treasurer* H. N. White.

OLD COLONY CAMERA CLUB, ROCKLAND, MASS.—Established 1890. Headquarters, Arnold Building. Annual meeting, first Saturday in January. *President*, David Smith; *Vice-President*, Emery H. Jenkins; *Secretary*, David Smith; *Treasurer*, Emery H. Jenkins.

ONEIDA CAMERA CLUB, ONEIDA, N. Y.—Established March, 1894. Headquarters, Post-Office Building, Main Street. Annual meeting, first Tuesday in March. *President*, Bradley S. Teale; *Vice-President*, Geo. R. Hauson; *Secretary*, Clinton R. Baker; *Treasurer*, Albert Dygert.

ORANGE CAMERA CLUB, ORANGE, NEW JERSEY.—Established 1892. Headquarters, Decker Building, 222 Main Street. Annual meeting, March 20th. *President*, George E. Melendy; *Vice-President*, G. A. Van Wagenen, M.D.; *Secretary*, Frank N. Lord; *Treasurer*, David S. Plumb.

OREGON CAMERA CLUB, PORTLAND, OREGON.—Established January 14, 1895. Headquarters, Oregonian Building, Portland, Oregon. Annual meeting, second Tuesday in January. *President*, Will. H. Walker; *Vice-President*, Frank C. Cover; *Secretary*, Milton P. Goldsmith; *Treasurer*, Fred. A. French. Membership August 1st, active, 120.

OTTAWA CAMERA CLUB, OTTAWA, CANADA.—Established 1894. Headquarters, Ottawa. Annual meeting, second Thursday in October. *President*, James Wilson; *Vice-President*, Miss Marian Whyte; *Secretary* and *Treasurer*, William Ide.

PHOTO SECTION HARTFORD SCIENTIFIC SOCIETY, HARTFORD, CONN. Headquarters, 65 Pratt Street. Annual meeting, October. *Chairman*, C. R. Mason; *Secretary* and *Treasurer*, L. W. H. Gradeksy.

PITTSBURGH AMATEUR PHOTOGRAPHERS' SOCIETY, PITTSBURGH, PA.—Established 1885. Incorporated 1896. Headquarters, Carnegie Library. Annual meeting, January. *President*, E. E. Keller; *Vice-President*, H. L. Christy; *Secretary*, Joseph H. Hunter, 520 Green Street; *Treasurer*, William J. Hunker.

PITTSFIELD CAMERA CLUB, PITTSFIELD, MASS.—Established 1892. Meetings held at residences of members. Annual meeting, February. *President*, J. F. Middleton; *Vice-President*, J. D. Roscoe; *Secretary*, J. E. Colton; *Treasurer*, J. H. Musgrove.

PLAINFIELD CAMERA CLUB, PLAINFIELD, CONN.—Headquarters, Babcock Building. Annual meeting, December. *President*, H. H. Coward; *Vice-President*, Louis Borsum; *Secretary*, J. Hervey Doane, 115 Park Avenue; *Treasurer*, H. W. Marshall.

PORTSMOUTH CAMERA CLUB, PORTSMOUTH, N. H.—Established 1897. Headquarters, 614 Crawford Street. *President*, Jesse P. Neville; *Secretary* and *Treasurer*, H. T. Richardson.

PROVIDENCE CAMERA CLUB, PROVIDENCE, R. I.—Established 1883. Headquarters, 87 Weybosset Street, Providence, R. I. Annual meeting, first Tuesday in June. *President*, Fred. P. Wilbur; *Vice-President*, W. Penn Mather; *Recording Secretary*, Albert F. Manchester; *Corresponding Secretary*, J. E. Davison, Pawtucket, R. I.; *Treasurer*, E. A. Darling.

PROVIDENCE Y. M. C. A. CAMERA CLUB, PROVIDENCE, R. I.—Established April, 1896. Headquarters, Y. M. C. A. Building, Providence, R. I. Annual meeting, April. *President*, Frank Wood; *Vice-President*, John A. Howland; *Secretary*, C. M. Mumford; *Treasurer*, J. M. Kimball, 2d.

RUTLAND CAMERA CLUB, RUTLAND, VT.—Established October, 1893. Annual meeting, second Tuesday in October. *President*, Cornele G. Ross; *Secretary* and *Treasurer*, V. F. Worcester.

SACRAMENTO CAMERA CLUB, SACRAMENTO, CAL.—Established June 4, 1895. Headquarters, 504 J Street. Annual meeting, June 4th. *President*, Capt. Thos. B. Hall; *Vice-President*, Ferdinand Kohler; *Secretary*, W. G. Woods, 420 J Street; *Treasurer*, R. P. Burr.

SAVANNAH CAMERA CLUB, SAVANNAH, GA.—Established June 1897. Headquarters, Bull and New Houston Streets. Annual meeting, first Wednesday in May. *President*, Dr. Wm. F. Aiken; *Vice-Presidents*, W. E. Grady, B. J. Apple; *Secretary* and *Treasurer*, C. Easton Yonge.

SCHUYLKILL CAMERA CLUB, SCHUYLKILL, PA.—Established July 5, 1889. Headquarters, O. F. Hall, Market Street. Annual meeting, May. *President*, A. W. Sheafer; *Vice-President*, Miss Elena Roads; *Secretary*, B. S. Simonds, 1432 W. Norwegian Street, Pottsville, Pa.; *Treasurer*, W. L. Sheafer.

SEATTLE CAMERA CLUB.—Established 1895. Headquarters, Seattle, Wash. Annual meeting, third Monday in January. *President*, Mrs. Chas. L. Denny; *Vice-President*, Dr. F. A. Churchill; *Secretary*, Eugene Ricksecker; *Treasurer*, Chas. W. Parker.

SPRINGFIELD CAMERA CLUB, SPRINGFIELD, MASS.—Established October 11, 1886. Headquarters, Y. M. C. A. Building, State and Dwight Streets. Annual meeting, third Wednesday in October. *President*, Bion D. Wheeler; *Secretary*, E. L. Pease; *Librarian*, F. W. Huntley. Membership, 82.

ST. LOUIS PHOTOGRAPHIC SOCIETY, ST. LOUIS, MO.—Established 1894. Headquarters, Y. M. C. A. Building, Grand and Franklin Avenues. Annual meeting, first Monday in December. *President*, Dr. C. H. Goodman; *Vice-President*, John Beggs Holman; *Secretary* and *Treasurer*, A. L. Bauer.

ST. PAUL CAMERA CLUB, ST. PAUL, MINN.—Organized 1893. Headquarters, St. Paul Fire and Marine Ins. Building. Annual meeting, first Tuesday in March. *President*, James Paris; *Vice-President*, D. T. Brown; *Secretary*, W. J. Sonnen; *Treasurer*, W. B. Thorne.

SUNNY SIDE CAMERA CLUB, ST. LOUIS, MO. — Organized October 10, 1891. Headquarters, 3d floor of 5900 South Broadway. Annual meeting, October 10th. *President*, Berthold W. Blumenthal; *Vice-President*, Edmund Broch; *Secretary* and *Treasurer*, Wm. Britchner.

SYRACUSE CAMERA CLUB, SYRACUSE, N. Y.—Organized 1886. Incorporated 1892. Headquarters, 322 So. Salina Street. Annual meeting, first Friday after first Monday in January. *President*, H. B. Buell; *Vice-President*, J. I. H. Wright; *Secretary*, Dan. H. Sweet; *Treasurer*, J. E. Bierhardt.

THE CAMERA CLUB, NEW YORK.—Established 1896. Headquarters, 3 West 29th Street. Annual meeting, second Tuesday in April. *President*, Wm. D. Murphy; *Vice-President*, Alfred Stieglitz; *Secretary*, Harry B. Reid; *Treasurer*, Frank M. Hale.

THE PAWTUCKET YOUNG MEN'S CHRISTIAN ASSOCIATION CAMERA CLUB.—Established May 4, 1898. Headquarters, Y. M. C. A. Rooms. Annual meeting, second Wednesday evening in May. *President*, J. Henry Weaver; *Vice-President*, S. H. Byron; *Secretary* and *Treasurer*, Geo. A. Harrington, 103 Cedar Street, Pawtucket, R. I.

THE PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.—Established November, 1862. Headquarters, 10 S. 18th Street. Annual meeting, April, second Wednesday. *President*, Robert S. Redfield; *Vice-Presidents*, George Vaux, Jr., and Walter P. Stokes; *Secretary*, Edmund Stirling; *Treasurer*, Anthony W. Robinson.

THE POSTAL PHOTOGRAPHIC CLUB.—Organized 1888. Headquarters, 120 Broadway, New York. Membership, 40. *President*, Albert J. LeBreton, Washington, D. C.; *Secretary*, F. O. Congdon, 120 Broadway, New York. Object: The circulation of an Album monthly, made up of two contributions from each member, together with a Note Book for criticism of prints, etc.

TOPEKA CAMERA CLUB, TOPEKA, KANS.—Established September 5, 1894. Annual meeting, second Tuesday in January. *President*, F. M. Tuckerman; *Vice-President*, R. H. Gaw; *Secretary*, F. M. Tuckerman; *Treasurer*, W. E. Culver.

TORONTO CAMERA CLUB, TORONTO, ONT.—Established 1891. Incorporated 1893. Headquarters, Forum Building, Yonge Street, Toronto, Ont. Annual meeting, first Monday in November. *President*, Edmund E. King, M.D.; *First Vice-President*, W. H. Moss; *Secretary* and *Treasurer*, John J. Woolnough, 94 McPherson Avenue.

TRENTON PHOTOGRAPHIC SOCIETY, TRENTON, N. J.—Established January, 1898. Headquarters, Room 11, Scott Building. Annual meeting, first Monday in February. *President*, S. S. Webber; *Vice-President*, W. C. Lawrence; *Secretary*, Grant Castner; *Treasurer*, F. P. Auten.

VALLEY CAMERA CLUB, PHENIX, R. I.—Established November, 1896. Headquarters, Phenix. Annual meeting, first Monday in April. *President*, W. E. Smith; *Secretary*, J. Bancroft Lawton; *Treasurer*, F. J. Hoxie.

Y. M. C. A. CAMERA CLUB OF DULUTH, MINN.—Established May 18, 1897. Headquarters, Y. M. C. A. Building. Annual meeting, first Wednesday in March. *President*, J. H. Jeronimous; *Vice-President*, C. F. How, Jr.; *Secretary* and *Treasurer*, Ernest G. Morse.

Y. M. C. A. CAMERA CLUB OF FITCHBURG.—Established October, 1896. Headquarters, F. Y. C. A. Building. Semi-annual meetings, first Thursday in January and July. *President*, George E. Nutting; *Vice-President*, E. R. Wilbur; *Secretary* and *Treasurer*, C. F. Harding, 2 Main Street.

UNITED KINGDOM.

AINTREE PHOTOGRAPHIC.—Established 1894. Headquarters, Aintree Institute, Nr. Liverpool. Annual meeting, March. *President*, C. H. Adkins; *Vice-Presidents*, R. Walker, D. J. Neill; *Secretaries*, David J. Kidd, D. Travis; *Treasurer*, John Harris.

ASHTON-UNDER-LYNE PHOTOGRAPHIC SOCIETY.—Established 1891. Headquarters, 10 Henry Square, Ashton-under-Lyne. Annual meeting, third Thursday in March. *President*, Dr. Alex. Hamilton; *Vice-Presidents*, Major Bradley, Thos. Glazebrook, Chas. E. Redfern, J.P., Abel Buckley, J.P., John W. Kenworthy, J.P., John Wilson, J.P., Tulloch Cheyne, Chas. Lord; *Secretary*, Robt. T. Marsland, 24 Park Parade, Ashton-under-Lyne; *Treasurer*, Walter Leigh, 200 Oldham Road; *Librarian*, Sam. A. Platt, 4 Cowhill Lane.

BATH PHOTOGRAPHIC SOCIETY.—Established 1888. Headquarters, Royal Literary and Scientific Institution. Annual meeting, last Wednesday in February. *President*, George Norman, Esq.; *Vice-President*, E. J. Appleby; *Secretary* and *Treasurer*, W. Middleton Ashman.

BIRMINGHAM NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.—Established 1858. Amalgamated 1894. Headquarters, Norwich Union Chambers, Birmingham. Annual meeting, February. *President*, Professor Poynting, D.Sc., F.R.S.; *Vice-Presidents*, R. W. Chase, Professor Lapworth; *Secretaries*, W. P. Marshall, P. S. Gray; *Treasurer*, C. A. Harrison.

BIRMINGHAM PHOTOGRAPHIC SOCIETY.—Established 1885. Headquarters, Athletic Institute, John Bright Street. Annual meeting, January. *President*, Sir. J. Benjamin Stone, M.P.; *Vice-Presidents*, G. F. Lyndon, J. P., E. C. Middleton, J. F. Hall Edwards, L.R.C.P., T. W. Robinson; *Secretary*, C. J. Fowler, Court Mount, Erdington; *Treasurer*, A. C. Gilbert.

BLAIRGOWRIE AND DISTRICT PHOTOGRAPHIC ASSOCIATION.—Established February, 1894. Headquarters, George Street, Blairgowrie. Annual meeting, third Tuesday in February. *President*, Alexander Geekie, Esq.; *Vice-Presidents*, J. B. Maclachlan and W. Grant Murray; *Secretary*, Thomas C. Gorrie; *Treasurer*, James Richardson.

BRADFORD PHOTOGRAPHIC SOCIETY.—Established 1895. Headquarters, the Bradford Grammar School. Annual meeting, third Monday in January. *President*, Alex. Keighley, Esq., F.R.P.S.; *Vice-Presidents*, Messrs. R. J. Appleton, W. Halstead, O. Nicholson, Percy Lund, A. P. Rendell, F. J. R. Sutcliffe; *Secretary*, J. Snowden, care of Messrs. Percy Lund, Humphries & Co., Ltd., Grawin St., Bradford, Yorkshire, England; *Treasurer*, F. Nicholson.

BRECHIN PHOTOGRAPHIC ASSOCIATION.—Established 1888. Headquarters, Y. M. C. A. Institute. Annual meeting, third Wednesday in September. *President*, Wm. Shaw Adamson, Carlston Castle; *Vice-Presidents*, R. W. Duke and J. D. Ross; *Secretary*, Alexander Watson, 75 River Street, Brechin; *Treasurer*, John E. Small.

BRISTOL AND WEST OF ENGLAND AMATEUR PHOTOGRAPHIC ASSOCIATION.—Headquarters, Literary and Philosophic Club, Berkeley Square. Annual meeting, January. *President*, H. A. Hood Daniel; *Vice-Presidents*, Edward Bryktman and Dr. Ormerod; *Secretaries*, Edward Bryktman, Lyndale, Redland Road, Bristol, and Martin Lavington; *Treasurer*, William Moline.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—Established 1831. Headquarters, Office, Burlington House, London. Annual meeting, Dover, September 13–20. *President*, Dr. Michael Foster; *Secretary*, G. Griffith; *Treasurer*, Prof. Carey Foster.

CAMERA SECTION WORCESTER TRICYCLE CLUB.—Established 1892. Headquarters, Bell Hotel, Worcester. Annual meeting, January. *President*, James Wilkes, Esq.; *Secretary*, T. J. Hobson, 15 Albany Terrace, Worcester; *Treasurer*, F. E. Hill.

"CAMERA & CO." A POSTAL PHOTOGRAPHIC CIRCULATING CLUB.—Established May, 1891. Headquarters, 14 Market Street, Pontypridd, South Wales. Monthly portfolios. *Honorary Secretary*, Albert O. Forrest.

CARDIFF PHOTOGRAPHIC SOCIETY.—Established 1886. Headquarters, 7, 8 Working Street. Annual meeting, second Friday in November. *President*, P. W. Allen, M.I.M.E. ; *Vice-Presidents*, G. H. Bedford, W. I. Jenkins ; *Secretary*, T. H. Faulks, 26 Merchants' Exchange ; *Treasurer*, C. E. Hancock.

CLYDESDALE CAMERA CLUB —Established 1889. Headquarters, Wemyss Bay. *President*, Henry Erskine Gordon, Esq. ; *Secretary* and *Treasurer*, Hon. A. Caroline Burns.

CORNISH CAMERA CLUB.—Established 1888. Headquarters, The Studio, Penzance, Cornwall. Annual meeting, May. *President*, W. E. Baily, C.C., F.L.S. ; *Vice-President*, R. Pearce Couch ; *Secretary*, H. Tonkin, 22 Market Place, Penzance, Cornwall ; *Treasurer*, A. R. F. Evershed, M.R.C.S.

CROYDEN MICROSCOPICAL AND NATURAL HISTORY CLUB, PHOTOGRAPHIC SECTION.—Established 1870. Headquarters, Public Hall, George Street, Croydon, Surrey. Annual meeting, January 17, 1899. *President*, I. M. Hobson, M.D., B.Sc. ; *Vice-President*, W. Murton Holmes ; *Secretary*, Harry D. Gower, 55 Benson Boad, Croydon, Surrey ; *Treasurer*, F. J. Townsend.

DERBY PHOTOGRAPHIC SOCIETY.—Established May, 1884. Headquarters, Y. M. C. A. Inst., Derby. Annual meeting, third Tuesday in January. *President*, Capt. W. de W. Abney, C.B., D.C.L., F.R.S.; *Vice-President*, Thos. A. Scotton ; *Secretary*, Edmd. Fearn ; *Treasurer*, F. H. Gandy.

DEVONPORT CAMERA CLUB.—Established 1891. Headquarters, Odd Fellows' Hall, Ker Street. Annual meeting, September. *President*, R. E. J. Lamb, Esq. ; *Vice-Presidents*, Coombes, Dart, Dymond, Turney ; *Secretary*, Wm. H. Lamb ; *Treasurer*, C. Croydon, Esq.

DUKINFIELD PHOTOGRAPHIC SOCIETY.—Established 1888. Headquarters, Co-operative Hall, Astley Street, Dukinfield. Annual meeting, Wednesday, January 17, 1899. *President*, T. H. Gordon, Esq., B.A., C.C. *Vice-Presidents*, S T. Ainsworth, Esq., J. W. Hadfield, Esq., J. T. Lees, Esq. ; *Secretary*, W. D. Roberts, 24 Chapel Street, Dukinfield ; *Treasurer*, J. Winterbottom, Alderdale Terrace, Chapel Street, Dukinfield.

"DUNDEE ADVERTISER" PHOTOGRAPHIC CLUB.—Established 1894. Headquarters, Mather's Hotel, Whitehall Street. Annual meeting, October. *Hon. President*, Sir John Levy, M.P. ; *President*, J. A. Mackenzie ; *Vice-President*, A. F. Gow ; *Secretary* and *Treasurer*, Archibald Campbell, 4 Stewart Terrace, Barnhill, Broughty Ferry, N. B.

DURHAM CITY CAMERA CLUB.—Established January, 1892. Headquarters, Shakespeare Hall, Durham. Annual meeting, January. *President*, Captain E. White ; *Vice-Presidents*, Messrs. I. F. Hobson, E. Meynell, and W. Moult ; *Secretary*, Robert Hauxwell, The Avenue, Durham ; *Treasurer*, Councillor W. Gray.

EASTBOURNE PHOTOGRAPHIC SOCIETY.—Established 1892 (March). Headquarters, Caldecott Museum Building, Lismore Road, Eastbourne. Annual meeting, January in each year. *President*, Henry Habgood, M.D. ; *Vice-Presidents*, H. M. Whitley, Rev. H. G. Jameson, and Major H. P. Molineux ; *Secretary* and *Treasurer*, J. J. Hollway, 11 Hyde Gardens, Eastbourne.

EDINBURGH PHOTOGRAPHIC CLUB.—Established 1881. Headquarters, 38 Castle Street, Edinburgh. Annual meeting, October. *President*, John Stewart Smith; *Secretary*, T. Barclay, 180 Dalkeith Road, Edinburgh; *Treasurer*, Geo. Cleland.

EDINBURGH PHOTOGRAPHIC SOCIETY.—Established 1861. Headquarters, 38 Castle Street, Edinburgh. Annual meeting, first Wednesday in June. *President*, Alexander Eddington, F.J.I.; *Vice-Presidents*, John Stewart Smith and James Hay; *Secretary*, J. S. McCulloch, W.S., 2 George Street, Edinburgh; *Treasurer*, George Cleland.

FAKENHAM DISTRICT CAMERA CLUB.—Established 1892. Headquarters, Lancaster, Temperance Hotel, Fakenham. Annual meeting, October, first Wednesday. *President*, Rev. Wm. Martin, B.A.; *Vice-Presidents*, Rev. A. E. Humphreys, M.A., Algernon Digby, M.A.; *Secretary* and *Treasurer*, Henry Newson, The Square, Fakenham, Norfolk.

GLASGOW PHOTOGRAPHIC ASSOCIATION.—Established 1862, Headquarters, 207 Bath Street. *President*, John Stuart; *Vice-President*, A. Lindsay Miller; *Secretary*, Fred. Mackenzie, 122 Wellington Street; *Treasurer*, George Bell.

GLASGOW AND WEST OF SCOTLAND AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1883. Headquarters, 180 West Regent Street, Glasgow, Scotland. Annual meeting, September. *President*, Thomas Steventon; *Vice-President*, Cameron Todd; *Secretary*, Wm. Goodwin, 3 Lynedoch St., Glasgow; *Treasurer*, Wm. J. B. Halley.

GLENALMOND PHOTOGRAPHIC CLUB.—Established June, 1890. Headquarters, Trinity College, Glenalmond, Perthshire. Annual meeting, September. *President*, Arthur S. Reid, M. A. F. G. S.; *Vice-President*, E. S. Lyttle, M. A.; *Sceretary*, G. O. Cunningham; *Treasurer*, T. N. J. Bell.

GLOSSOP DALE PHOTOGRAPHIC SOCIETY, GLOSSOP.—Re-established 1883. *President*, E. Partington, Esq., J. P.; *Vice-Presidents*, S. H. Wood Esq., Col. W. Sidebottom, M. P.; *Secretary*, T. W. Sharpe, 1 Pikes Lane, Glossop; *Treasurer*, J. Hardman, Norfolk Square, Glossop.

GOLDSMITH'S INSTITUTE CAMERA CLUB.—Established 1891. Headquarters, Goldsmith's Institute, New Cross, London, S. E. Annual meeting, October. *President*, J. W. Penfold, Esq.,; *Vice-Presidents*, J. S. Redmoyne, A. Wood; *Honorary Secretary*, Clifford B. Storey, *Assistant Honorary Secretary*, E. E. Cochrane; *Treasurer*, Clifford B. Storey.

GOSPEL OAK PHOTOGRAPHIC SOCIETY.—Established October, 1894. Headquarters, Congregational Schools, Lismore Road, Kentish Town. Annual meeting, March. *President*, Rev. H. Le Pla; *Vice-President*, F. H. Hall; *Secretary*, W. A. Palmer, 13 Dale Road, Kentish Town, N. W.; *Treasurer*, J. E. Rayner.

HACKNEY PHOTOGRAPHIC SOCIETY, LONDON.—Established 1889. Headquarters, The Pembury Tavern, Lower Clapton.—Annual meeting, March. *President*, Edward Puttock (Yearly Office); *Secretary*, W. F. Fenton-Jones, 12 King Edward Road; *Treasurer*, Walter L. Barker.

HANDSWORTH PHOTOGRAPHIC SOCIETY.—Established 1894. Headquarters, College House, Hamstead Rd. Annual meeting, first Thursday in year. *President*, Philip Whitehouse, Esq.; *Vice-Presidents*, (four); *Secretary*, G. D. K. Boyle; *Treasurer*, C. F. Jarvis.

HELIOS POSTAL PHOTOGRAPHIC CLUB.—Established 1887. Headquarters, 55 Locksley Street, Burdett Road, London E. *Secretary* and *Treasurer*, Henry Everett.

HEREFORDSHIRE PHOTOGRAPHIC SOCIETY.—Established 1885. Headquarters, Clarence House, West Street, Hereford. Annual meeting, October. *President*, Ald. T. Blake, J. P.; *Vice-Presidents*, A. Watkins, Esq., T. J. Salway, Esq., J. Parker, Esq., C. E., W. M. Wilson, Esq., W. J. Humfrys, Esq., H. H. Parry, Esq.; *Honorary Secretary*, Mr. Cecil Gethen, 9 St. Nicholas Street, Hereford; *Treasurer*, Mr. W. E. Haines, High Town, Hereford.

HOLMFIRTH AMATEUR PHOTOGRAPHIC SOCIETY.—Headquarters, Holmfirth, England. Annual meeting, August. *President*, Arthur Preston; *Secretary* and *Treasurer*, David Bilson, Birchin House, Holmfirth.

HUDDERSFIELD NATURALIST AND PHOTOGRAPHIC SOCIETY.—Established 1847. Headquarters, Y. M. C. A. Lecture Room. Annual meeting, December 17, 1898. *President*, G. T. Porritt., F. L. S., F. E. S.; *Vice-Presidents*, H. G. Brierley, T. W. Woodhead; *Honorary Secretary*, A. Clarke, 9 St. Andrews Road, Huddersfield; *Treasurer*, A. W. Whiteley.

IPSWICH SCIENTIFIC SOCIETY PHOTOGRAPHIC SECTION.—Established 1869. Headquarters, Museum, Ipswich. Annual meeting, January. *Secretary*, Frank Woolnough; *Treasurer*, Henry Miller.

KEIGHLEY AND DISTRICT PHOTOGRAPHIC ASSOCIATION.—Established November, 1888. Headquarters, Mechanics Institute, Keighley. Annual meeting, September, 2d Tuesday. *President*, Thomas Heaps, Esq.; *Vice-Presidents*, Alex. Keighley, F.R.P.S., P. W. Hill, and J. H. Bentley; *Secretaries*, Wm. H. Hainsworth, 66. Belgrave Rd., Keighley, and C. H. Smith; *Treasurer*, Walter Mitchell.

LEEDS PHOTOGRAPHIC SOCIETY.—Established 1852. Headquarters, Leeds Institute of Science, Art, and Literature. Annual meeting, first Thursday in December. *President*, Peter Gilston, J. P.; *Vice-President*, Rev. J. Beanland, M. A.; *Secretary* and *Treasurer*, Alfred Naylor, 2 Providence Terrace, Leeds.

LEWES PHOTOGRAPHIC SOCIETY.—Established 1888. Headquarters, Municipal Buildings. Annual meeting, September. *President*, S. I. Wightman, Esq.; *Vice-President*, J. Tunks, Esq.; *Secretary* and *Treasurer*, Geo. Carpenter, 81 High Street, Lewes.

MANCHESTER AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1885. Headquarters, 15 Brazenose Street, and The Athenæum. Annual meeting, last Tuesday in January. *President*, J. W. Wade, Esq.; *Vice-Presidents*, T. M. Brook, J. Davenport, G. E. Mellor, and H. Smith; *Secretary*, F. W. Parrott, 3 Elm Road, Altrincham; *Treasurer*, Chas. Dawson.

MANCHESTER Y. M. C. A. PHOTOGRAPHIC CLUB.—Established January, 1890. Headquarters, Y. M. C. A., 56 Peter Street, Manchester. Annual meeting, December. *President*, Geo. T. White, Esq.; *Vice-President*, A. C. Harrison, Esq.; *Honorary Secretary*, J. W. Price; *Honorary Treasurer*, Geo. Dixon.



Photographed by CHAS. L. ROSEVEAR.
Engraved by
WESTERN ENGRAVING CO.,
St. Louis, Mo.

A CONVENTION PRIZE WINNER.
P. A. of A., 1898.



MIDLOTHIAN CAMERA CLUB.—Established 1889. Headquarters, Edinburgh. Annual meeting, November. *President*, D. Bruce Peebles ; *Vice-President*, William Stewart, M.D. ; *Secretary*, Alexander Calder ; *Treasurer*, R. C. Ewart.

NEWTON HEATH CAMERA CLUB.—Established 1093. Headquarters, Wesleyan School, Oldham Road. *President*, Mr. Fallows ; *Vice-President*, Mr. Cresswell ; *Secretary*, J. Fortune.

NORTH MIDDLESEX PHOTOGRAPHIC SOCIETY.—Established 1888. Headquarters, Jubilee House, Hornsey Road, N. London. Annual meeting, second Monday in January. Weekly meetings. *President*, J. C. S. Mummery ; *Vice-Presidents*, W. Brame Goodwin and A. H. Lisett ; *Secretary*, H. Stuart ; *Treasurer* Henry Smith.

NOTTINGHAM CAMERA CLUB.—Headquarters, Mechanics' Institution, Nottingham, England. Annual meeting, first Friday in October. *President*, His Grace the Duke of Newcastle ; *Secretary*, Lawrence Wilkens, Esq.

OLDHAM PHOTOGRAPHIC SOCIETY.—Established May, 1867. Headquarters, The Lyceum, Union Street, Oldham. Annual meeting, last Thursday in October. *President*, William A. Nash ; *Vice-President*, R. T. Taylor ; *Secretary*, Thos. Widdop, 17 Queen Street, Oldham ; *Treasurer*, T. Heywood.

PAISLEY PHOTOGRAPHIC SOCIETY.—Established 1857. Headquarters, 9 Gauze Street, Paisley. Annual meeting, April. *President*, Robert Ferrier ; *Vice-President*, Thomas Reid, Jr. ; *Secretary*, Robert Milne, 21 Glenview Terrace, Paisley ; *Treasurer*, Andrew Morris.

PETERBORO' PHOTOGRAPHIC SOCIETY. — Established 1887. Headquarters, for monthly meetings only, the "Bedford" Hotel. Annual meeting, first Monday in June. *President*, Dr. G. Kirkwood ; *Vice-Presidents*, Dr. Walker, E. Worthington, G. W. Leigh, Esq. ; *Secretary*, A. W. Nicholls, 11 Cromwell Road, Peterboro' ; *Treasurer*, H. C. Lilley.

PHOTOGRAPHIC CONVENTION OF THE UNITED KINGDOM.—Gloucester. Meeting, July, 1899. *President*, W. Crooke, Esq. ; *Retiring President*, John Stuart, Esq. The Photographic Convention was founded in 1886 for the advancement of photography, and to afford opportunities for personal intercourse and exchange of ideas amongst those interested in the art, from all parts of the United Kingdom. Meetings have been held at the following centres : Derby, Glasgow, Birmingham, London, Chester, Bath, Edinburgh, Plymouth, Dublin, Shrewsbury, Leeds, and Great Yarmouth. *Past Presidents :* J. Trail Taylor, Andrew Pringle, C. H. Bothamley, George Davison, William Bedford, George Mason, Sir Howard Grubb, A. Haddon, H. P. Robinson, F. P. Cembrano. The Council of the Convention is empowered to make grants from the surplus funds under its control in aid of photographic research. *Honorary Secretary*, F. A. Bridge, East Lodge, Dalston Lane, London, N. E.

PHOTOGRAPHIC SECTION NORTHAMPTON NATURAL HISTORY AND FIELD CLUB.—Headquarters, 8 Abington Street. Annual meeting (no fixed date). *President*, H. Manfield, Esq. ; *Secretary* and *Treasurer*, Charles H. Dorman, A.R.I., B.A.

PHOTOGRAPHIC SOCIETY OF IRELAND. Headquarters, 35 Dawson Street. Annual meeting, April. *President*, Alfred Werner ; *Vice-Presidents*, T. Ruthven, A. M. Geddis ; *Secretary*, Victor E. Smyth ; *Treasurer*, Wm. Bewley.

PUTNEY PHOTOGRAPHIC SOCIETY.—Established 1890. Headquarters, 102 High Street, Putney, Surrey. Annual meeting, May. *President*, Dr. W. J. Sheppard; *Vice-Presidents*, John A. Hodges, F.R.P.S., H. Kimber, M.P., and L. S. Zachariasen; *Secretary* and *Treasurer*, Wm. Martin, 4 Lower Parkfields, Putney, S. W.

RAMSGATE CAMERA CLUB.—Established 1894. Headquarters, Victoria Temperance Hotel. Annual meeting, March. *President*, vacant; *Vice-Presidents*, E. E. Wastall, Esq., J.P.; W. C. Bull, Esq., B.A., and W. T. Davey, Esq.; *Secretary* and *Treasurer*, Frederick I. Bear, 1 Guilford Lawn.

RICHMOND CAMERA CLUB.—Established 1890. Headquarters, Greyhound Hotel, Richmond. Annual meeting, May. *President*, F. P. Cembrano; *Vice-Presidents*, E. D. Purcell, G. Ardaseer; *Secretary*, C. H. Davis; *Treasurer*, J. B. Huddy.

ROCHDALE AND DISTRICT PHOTOGRAPHIC SOCIETY.—Established 1890. Headquarters, unsettled. *President*, I. A. Bright, Esq., J.P.; *Secretaries*, H. and W. Bamford, 242 Yorkshire St., Rochdale.

RODLEY PHOTOGRAPHIC SOCIETY, RODLEY, NEAR LEEDS, ENGLAND.—Established 1893. Headquarters, Rodley. Annual meeting, January. *President*, Wm. Broughton; *Secretary*, H. Crossley, Rodley, Leeds; *Treasurer*, John Hardaker, Rodley, Leeds.

ROTHERHAM PHOTOGRAPHIC SOCIETY.—Established October, 1889. Headquarters, 5 Frederick Street, Rotherham. Annual meeting, October (first Tuesday). *President*, Dr. F. B. Judge Baldwin; *Vice-Presidents*, E. Isle Hubbard, James Leadbeater, and James Turner; *Secretary*, Henry C. Hemmingway; *Treasurer*, Alfred S. Lyth.

ROYAL PHOTOGRAPHIC SOCIETY.—Established 1853. Headquarters, 12 Hanover Square, London, W. Annual meeting, second Tuesday in February. *President*, the Right Honorable the Earl of Crawford, K.T.; *Honorary Secretary*, Col. J Waterhouse, I.S.C.; *Assistant Secretary*, R. Child Bayley; *Treasurer*, G. Scamell.

SCARBOROUGH AND DISTRICT PHOTOGRAPHIC SOCIETY.—Established October, 1892. Headquarters, The Museum, Scarborough. Annual meeting, October. *President*, Frederick Dale, M.D., M.R.C.S.; *Vice-President*, James H. Rowntree; *Secretary*, Harry Wanless; *Treasurer*, John G. Magginson.

SHEFFIELD OPTICAL LANTERN SOCIETY.—Established 1890. Headquarters, Saint Paul's Schools, Cambridge St. Annual meeting, October 20th. *President*, Dr. J. A. Manton; *Vice-Presidents*, Messrs. J. H. Lygo, J. Clowes; *Secretary*, T. G. F. Allen, 59 Melrose Road, Sheffield.

SUN & CO.: POSTAL PHOTOGRAPHIC CLUB.—Established 1886. *Secretary*, Martin J. Harding, Myrtle Villa, Hawthorn Road, Shrewsbury, England.

SWANSEA ART SOCIETY (name recently changed). Established 1885. Headquarters, Royal Institution of South Wales. Annual meeting, November. *President*, Colonel Morgan, R.E.; *Secretary*, Wm. Terrill; *Treasurer*, Arch. Goldie.

TALBOT ALBUM CLUB.—*Honorary Secretary*, Fred. H. Davies, 265 Coventry Road, Birmingham.

THE LANCASTER PHOTOGRAPHIC SOCIETY.—Established 1889. Headquarters, Stonewell, Lancaster. Annual meeting, last Tuesday in March. *President*, Alan Garnett, Esq; *Vice-Presidents*, Messrs. J. W. Pickard, R. W. Wearing; *Secretary*, W. Briggs; *Treasurer*, Mr. W. H. Satterthwaite.

THE LEAMINGTON AMATEUR PHOTOGRAPHIC SOCIETY.—Established about 12 years. Headquarters, Pump Room, Leamington. Annual meeting, first week in October. *President*, Rev. Ed. Healy; *Honorary Secretary*, Signor Aspa; *Treasurer*, B. Magrath, Esq.

THE LIVERPOOL AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1863. Headquarters, Eberle Street, Liverpool. Annual meeting, second Thursday in December. *President*, W. Prior Christian; *Vice-Presidents*, E. Rimbault Dibdin, John H. Welch; *Honorary Secretary*, Fred. A. Schierwater; *Honorary Treasurer*, P. H. Phillips.

THE MONKLANDS PHOTOGRAPHIC SOCIETY.—Established 1893. Headquarters, Library Building, Airdrie. Annual meeting, first Tuesday in October, *President*, John W. Eadie; *Vice-President*, R. C. Platt; *Secretary*, Wm. Dixon Gray; *Treasurer*, S. H. Wood.

THE POSTAL PHOTOGRAPHIC CLUB.—Established October, 1886. This Club is the oldest postal photographic society in England, with the exception of "The Talbot Album Club," which was started a few months earlier in the same year. Headquarters, Walton Manor Lodge, Oxford. Number of members limited to 30. *Secretary* and *Treasurer*, Reginald A. R. Bennett, M.A. (Oxon.).

THE STEREOSCOPIC CLUB.—Established 1889. Headquarters, Brooklands. Annual meeting, January. *President*, James Whitelegg; *Secretary*, W. I. Chadwick, F. R.P.S. Westwood Sale, Cheshire.

THE STEREOSCOPIC SOCIETY.[1]—Established 1893. Headquarters, Huntly, N. B. *President*, W. W. Stainthorpe, J.P., M.D.; *Secretary* and *Treasurer*, B. Diveri, B.A.

TUNBRIDGE WELLS AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established January, 1887. Headquarters, Club room, Mechanics Institute. Annual meeting, January. *President*, Francis G. Smart, M.A.; *Vice-Presidents*, Rev. A. T. Scott, E. R. Ashton, C. Leeson Prince, F.R.A.S, F.R.Met.S.; *Secretary*, Joseph Chamberlain, 14 Calverley Park, Gardens; *Treasurer*, B. Whitrow.

UTTOXETER PHOTOGRAPHIC SOCIETY.—Established 1890. Headquarters, Carter Street. Annual meeting, April. *President*, Rev. C. F. L. Barnwell; *Vice-Presidents*, Hugo Meynell, Esq., and F. A. Bolton, Esq.; *Secretary*, Alfred Parker, Esq.; *Treasurer*, R. T. A. Hardy, Esq.

WALSALL AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1892. Headquarters, George Hotel, Walsall. Annual meeting, September 30th. *President*, S. A. Newman, Esq.; *Secretary* and *Treasurer*, E. A. Day, 14 Westbourne Road, Walsall.

WALTON PHOTOGRAPHIC SOCIETY, LIVERPOOL.—Established 1889. Headquarters, Walton Church Schools. Annual meeting, February. *President*, Geo. Latimer. *Secretary* and *Treasurer*, J. Bickerstaff, 79 Rancliffe Road, Walton, Liverpool.

WARRINGTON PHOTOGRAPHIC SOCIETY.—Established 1887. Headquarters, Warrington Technical Institute. Annual meeting, January. *President*, John Fairhurst; *Vice-Presidents*, H. N. Houghton, H. Bond; *Secretary*, F. W. Knowles, 77 Bridge Street; *Treasurer*, Peter Dalton.

[1] Formerly the "Stereoscopic Postal Exchange Club."

WEST LONDON PHOTOGRAPHIC SOCIETY.—Established 1888. Headquarters, Broadway Lecture Hall, Hammersmith. Annual meeting, second Friday in October. *President*, G. Lamley, Esq. ; *Past-President*, G. F. Blackmore, Esq. ; *Secretary*, Alfred Ebes, 183 The Grove, Hammersmith ; *Treasurer*, H. Selby.

WINDSOR AMATEUR RESEARCH CAMERA CLUB.—Established 1893. Headquarters, Montpelier House. Annual meeting, December. *President*, Lord Mayor of Belfast, James Henderson, Esq., J.P. ; *Vice-President*, James Collins ; *Secretary*, Wm. Jas. Gibson, Montpelier House, Belfast ; *Treasurer*, Robert B. Gardiner.

WORCESTERSHIRE PHOTOGRAPHIC SURVEY SOCIETY.—Established March 16, 1896. Headquarters, Victoria Institute, Worcester. Annual meeting, January or February. *President*, J. W. Willis Bund, Esq. ; *Secretary*, Thos. I. Hobson, 15 Albany Terrace, Worcester ; *Treasurer*, Mrs. Berkeley, Cotheridge Court, Worcester.

YORK PHOTOGRAPHIC SOCIETY. *President*, Thomas Hunter ; *Vice-President*, W. Weatherill ; *Council*, T. Brown, A. H. Hardcastle, Watson Hirst, J. Saville ; *Secretary*, Frederic G. P. Benson, 50 Scott Street, York.

OTHER FOREIGN SOCIETIES.

AMATEUR FOTOGRAFEN-VEREENIGING TE AMSTERDAM.—Established September 1, 1887. Headquarters, Handboogstraat 2. Meetings, fortnightly. *President*, Ign. Bispinck ; *Secretary*, D. Wilmerink ; *Treasurer*, A. W. de Flines.

AMATEUR PHOTOGRAPHEN-VEREIN IN LIEGNITZ.—Established 6th December, 1891. Mitglied des Verbandes deutscher und oesterreichischer Amateur-Photographen, Regelmässige Vereinssitzungen Freitag nach dem 1. und 15. eines jeden. Monats. Annual meeting, im Februar jedes Fahres. *President*, Max Engler, Ober-Postassistent ; *Secretary* and *Treasurer*, Erdmann Loebner.

AMAT. PHOT. CLUB, "DAGUERRE."—Groningen, Holland. *President*, G. P. Smith ; *Vice-President*, H. W. Fresemann Viëtor ; *Secretary*, N. de Jager ; *Treasurer*, C. A. M. van Riet.

AMATÖR FOTOGRAFEN, CHRISTIANIA.—Established April 24, 1888. Headquarters, Christiania. *President*, Dr. Oscar Platon, Professor at the University. Christiania ; *Vice-President*, T. Blixrud ; *Secretary*, Alb. Rynning ; *Treasurer*, I. A, Mörch.

ASSOCIATION BELGE DE PHOTOGRAPHIE.—Established 1874. Headquarters, Brussels (Belgium). Annual meeting, Pentecost, in one of the towns where a section is established. *President*, Joseph Casier ; *Vice-Presidents*, MM. J. Maes and F. Massange de Louvrex ; *Secretary*, M. Vanderkindere ; *Treasurer*, Arth. Nyst.

ASSOCIAZIONE DEGLI AMATORI DI FOTOGRAFIA.—Established Roma. Headquarters, Via Nazionale 143a. *President*, Antonio Ruffo, Principe della Scaletta ; *Vice-President*, Comm. Carlo Encrani ; *Secretary*, Aev. Giuseppe Martini ; *Treasurer*, Br. Francesco Bondesio.

CIRCOLO FOTOGRAFICO LOMBARDO.—400 members. Milano, Via Principe Umberto, 30. *President*, Conte Cesare del Majno; *Vice-President*, Zambellini Avv. Michele; *Secretary*, Borghi Dott. Giuseppe; *Director*, Chizzolini Ing. Antonio; *Manager*, Ritter Vittorio; *Councillors*, Bassani Gigi, Canetta Rag. Ettore; *Auditor of Accounts*, Vittorio Zuccoli-Ing. Piero Fontana.

CORRESPONDENZ-VEREIN VON FREUNDEN DER PHOTOGRAPHIE.—Estabished 1889. Die Mitglieder, die innerhalb Deutschlande wohnen, verkehren mit einander durch Wanderkästen. *Hauptordner*, Pastor M. Allihu; *Ordner des I. Kreises*, O. Küllenberz; *des II. Kreises*, Graf. Rothkirch; *des III. Kreises*, G. Richter.

CLUB ALPIN SUISSE.—Fondé en 1863. Headquarters, Neuchatel (Comité central). Annual meeting, en 1898 à Langenthal. *President*, M. Eugène Colomb; *Vice-President*, M. Alexandre Perrochet; *Secretary*, Dr. Charles Meckenstock; *Treasurer*, M. Fritz Sandoz.

DEUTSCHER PHOTOGRAPHEN-VEREIN.—Established 1876 (29 Dezember). Headquarters, Weimar. Alljährlich eine Wanderversamlung. *President*, K. Schwier, Weimar; *Vice-President*, Karl Wunder, Hannover; *Secretary*, C. Kesselhuth, Hildesheim; *Treasurer*, K. Schwier, als Geschäftsführer.

DILETTANTI FOTOGRAFI DI NAPOLI (CAMERA CLUB).—Established 1891. Headquarters, Villa Comunale Napoli. Annual meeting, Decembre e Gennaio di agui anno. *President*, Duca di Schiavi; *Vice-President*, Sigr. Waldemaro Fuchs; *Secretary*, Sigr. Cav. Raffaele Montuoro; *Treasurer*, Sigr. Cav. Luigi Fortunato.

MONTREAL CAMERA CLUB.—Established 1890. Incorporated 1893. Headquarters, 4 Phillips Square, Montreal. Annual meeting, first Tuesday in May. *President*, Frank R. Redpath; *Vice-President*, George Sumner; *Secretary* and *Treasurer*, A. Clarence Lyman, 157 St. James Street, Montreal.

PHOTO-CLUB DE LYON.—Established en 1888. Headquarters, 12 Rue de la Charité. Annual meeting, December. *President*, Regis Flachat; *Vice-President*, Lucien Begule et C. Bernard; *Secretary*, Charles Bouchage; *Treasurer*, Ferdinand Abel.

PHOTO-CLUB ORAN, ALGERIA.—Established 1892. Headquarters, 12 Boulevard Séguin. Annual meeting, second Sunday December. *President*, A. Godillot, notaire; *Vice-President*, Capitaine Michel, du 2d Regiment des Zouaves; *Secretary*, J. S. Levy, 51 Bd. National; *Treasurer*, E. Brenant.

PHOTO-CLUB ROUENNAIS.—Société D'Amateurs Photographes fondée 1891. Siège social, Hôtel des Sociétés savantes. Atelier de pose—Laboratoire—Bibliothèque salle de lecture ouvrages et journaux spéciaux, Rue de la République, 43. *Président*, M. Abel Buguet, A.; *Vice-Présidents*, MM. Louis Chesneau-Lethuillier, Albert Marguery; *Trésorier*, Charles Lebert; *Secrétaire*, Maurice Lucas, rue du Sacre, 9; *Secrétaire-Adjoint*, René Duval, rue Danguy, 1.

PHOTOGRAPHISCHE GESELLSCHAFT IN WIEN.—Established 1861. Headquarters, Wien. Annual meeting, January. *President*, Ottomar Volkmer, k. k. Hofrath.; *Vice-Presidents*, Dr. Carl Rjöhm von Rjöhmersheim, k. k. Hofrath; *Secretary*, Dr. Joseph Székely, Photograph; *Treasurer*, Ludwig Schrank, k. k. Regierungsrath.

PHOTOGRAPHISCHER VEREIN IN GÖTTINGEN.—Established Mai. 1893. Headquarters, Hotel "Englisher Hof" in Göttingen. Annual meeting, April. *President*, Dr. Götting; *Secretary*, Professor Dr. Abegg; *Treasurer*, Horstmann.

PHOTOGRAPHISCHER VEREIN ZU BERLIN.—Established, 1863. Headquarters, Architecten Vereinshaus, Wilhelmstr., 91, 92. Meeting, Jeden 3ten Donnerstag im Monat. *President*, Hofphotograph Paul Grundner; *Vice-President*, Hofphotograph T. Reichard; *Secretary*, Director Schultz-Hemke; *Treasurer*, E. Martini i fa. Schippang & Co.

PHOTO-UNION FRANÇAISE, RUE DU PONT-MOUJA.—Headquarters, No. 1 (20 Membres). Annual meeting, Réunion tous les mois. *President*, Aëiné Voignier; *Vice-President*, Charles Schmitt; *Secretary*, Felix Roy; *Treasurer*, Henri Chouvenin.

SCHWEIZERISCHER PHOTOGRAPHEN VEREIN.—Established 1886. *President*, E. Pricam, Genf.; *Vice-President*, R. Ganz, Zürich; *Secretary*, Hermann Linck, Winterthur; *Treasurer*, A. Wicky, Bern; *Bibliothekar*, Ph. Linck, Zürich.

SOCIÉTÉ DES AMATEURS PHOTOGRAPHES DE PARIS.—Established a Paris. Headquarters, 339 rue St. Martin. *President*, H. Laedlein; *Vice-President*, Dufresne; *Secretary*, Maxime Brault, 97 Bvde. Malesherbes (Paris); *Treasurer*, Mongodin.

SOCIÉTÉ FRANÇAISE DE PHOTOGRAPHIE.—Established 1854. Headquarters, 76 Rue des Petits Champs, Paris. Annual meeting, Réunion le 1er Vendredi de chaque mois. *President*, G. Lippmann; *Vice-President*, A. Davanne; *Secretary*, S. Pector; *Treasurer*, E. Oudra.

SOCIÉTÉ GENEVOISE DE PHOTOGRAPHIE.—Established 1681. Headquarters, Grand Mésel 1., Genève. Meeting, every month. *President*, Dr. A. Mazel, *Vice-President*, Dr. E. Batault; *Secretary*, T. Bosson; *Treasurer*, L.s. Jaquerod.

SOCIÉTÉ PHOTOGRAPHIQUE DE RENNES (ILLE A VILAINE), FRANCE.—Established 1890. Headquarters, rue de la Chalstou's. Annual meeting, 1er ou 2me Vendredi de Décembre. *President*, M. Georges Fontaine; *Vice-Presidents*, M. le Capitaine Parfait et M. le Vicomte Christian de Rengervé; *Secretary*, M. Etienne Maignan; *sig Adjoint*, Mr. R. Letestre; *Treasurer*, M. Boucherot.

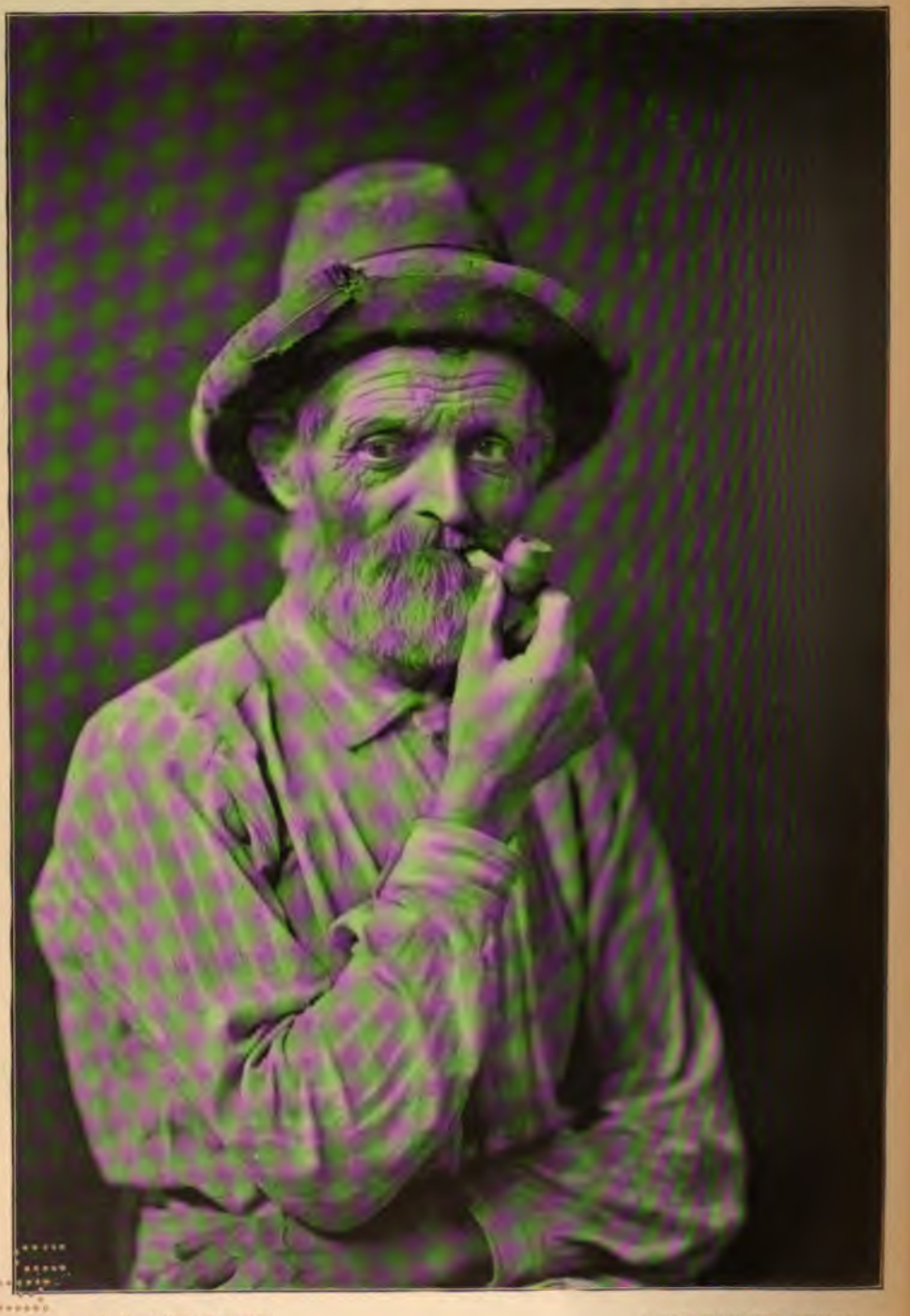
SOCIÈTÉ PHOTOGRAPHIQUE PROFESSIONALE, SUCCÈDANT À CERCLE DES EFFIGISTES ET SOCIÈTÉ DES EMPLOYÉS PHOTOGRAPHES.—Established 1878, 30 membres. Headquarters, Place St. Gervais, 6. Annual meeting (Juillet), réunion 1er Lundi de chaque mois. *President*, T. Dovaz, 3. rue des Minoteries; *Vice-President*, F. Mazuy, 4 Place Cornavin; *Secretary*, A. Chevalley, rue Pradier, 9; *Treasurer*, F. Barral, rue des Bains. Toutes les communications au Secrètaire.

UNION NATIONALE DES SOCIÉTÉS PHOTOGRAPHIQUES DE FRANCE.—Established en 1892. Headquarters, 76 rue des Petits-Champs à Paris. Annual meeting, à la Pendente; *President* M. Janssen, de l' Institut; *Vice-Presidents*, MM. Bucquet et Riston. *Secretary-gl.*, M. S. Pector, 9 rue Limohr, á Paris; *Treasurer*, M. M. Berthaud, 9 rue Cadet á Paris.

VEREIN VON FREUNDEN DER PHOTOGRAPHIE.—Established, Braunschweig, 1890. Headquarters, Hôtel Preussischer Hof. Meeting, Monatlich, am Mitwoch nach dem 15ten. *President*, Dr. phil. David Kaempfer; *Vice-President*, Dr. med. Felix Avonheim; *Secretary*, Adolf Steinhausen; *Treasurer*, Willy Berge.

VEREIN VON FREUNDEN DER PHOTOGRAPHIE ZU JENA.—Established 1. September, 1891. Headquarters, Jeden 1. und 3. Donnerstag im Monat im Gasthof zur Guten Quelle. Annual meeting, Praktischer Rathgeber. *President*, Konrad Roch; *Vice-President*, C. Hoffmann; *Secretary*, Oscar Trinkler; *Treasurer*, Carl Spath.

VEREIN ZUR FÖRDERUNG DER PHOTOGRAPHIE ZU BERLIN.—Established 1869. Headquarters, Berlin, Hotel Borussia. Meeting, Jeden 2. und 4. Freitag im Monat. *President*, Professor O. Raschdorff; *Vice-President*, Dr. E. Vogel; *Secretary*, Paul Hanneke, Berlin W., Buelow Str. 99; *Treasurer*, Gustav Schmidt.



Photographed by J. WILL KELLMER.
Engraved by
SANDERS ENGRAVING CO.,
St. Louis, Mo.

A CHARACTER STUDY.

TABLES.

TABLE OF THE ELEMENTS:

THEIR SYMBOLS, ATOMIC WEIGHTS, AND EQUIVALENTS.

	Symbol.	Atomic Weight.	Equivalent.		Symbol.	Atomic Weight.	Equivalent.
Aluminium	Al	27.02	9.007	Mercury	Hg	199.8	99.9
Antimony	Sb	120.	40.	Molybdenum	Mo	95.8	19.16
Arsenic	As	74.9	24.97	Nickel	Ni	58.6	29.3
Barium	Ba	136.8	68.4	Niobium	Nb	94.	31.33
Beryllium	Be	9.08	4.54	Nitrogen	N	14.01	4.67
Bismuth	Bi	208.	69.33	Osmium	Os	193.	24.125
Boron	B	10.9	3.66	Oxygen	O	15.96	7.98
Bromine	Br	79.75	79.75	Palladium	Pd	106.2	26.55
Cadmium	Cd	112.	56.	Phosphorus	P	30.96	10.32
Cæsium	Cs	133.	132.7	Platinum	Pt	194.3	48.575
Calcium	Ca	39.9	19.95	Potassium	K	39.04	39.04
Carbon	C	11.97	2.99	Rhodium	Ro	104.	26.
Cerium	Ce	139.9	46.6	Rubidium	Rb	85.2	85.2
Chlorine	Cl	35.37	35.37	Ruthenium	Ru	104.4	26.1
Chromium	Cr	52.4	26.2	Selenium	Se	78.8	39.4
Cobalt	Co	59.	29.5	Silicon	Si	28.3	7.
Copper	Cu	63.2	31.6	Silver	Ag	107.66	107.66
Didymium	Di	143.0	47.8	Sodium	Na	23.	23.
Erbium	E	165.9	55.3	Strontium	Sr	87.3	43.65
Fluorine	F	19.1	19.1	Sulphur	S	31.98	15.99
Gallium	Ga	69.	23.	Tantalum	Ta	182.	60.67
Gold	Au	197.	65.66	Tellurium	Te	125.	62.5
Hydrogen	H	1.	1.	Thallium	Tl	203.64	203.64
Indium	In	113.4	37.8	Thorium	Th	231.87	57.97
Iodine	I	126.53	126.53	Tin	Sn	117.8	58.9
Iridium	Ir	192.5	48.125	Titanium	Ti	48.0	12.
Iron	Fe	55.9	27.95	Tungsten	W	183.6	30.6
Lanthanum	La	138.5	46.17	Uranium	U	240.	60.
Lead	Pb	206.4	103.2	Vanadium	V	51.2	17.07
Lithium	Li	7.01	7.01	Yttrium	Y	89.6	29.87
Magnesium	Mg	24.	12.	Zinc	Zn	65.2	32.6
Manganese	Mn	55.	27.5	Zirconium	Zr	90.	45.

NOTE.—The equivalent numbers are the smallest quantities of the element that unite with one part of hydrogen, eight parts of oxygen, or thirty-five parts of chlorine.

THE CONVERSION OF GRAMMES (OR CUBIC CENTIMETERS) INTO OUNCES AND GRAINS, and *vice versa*.

Conversion of Grammes into Grains.

Grammes.	Grains.
1	15.43
2	30.86
3	46.29
4	61.73
5	77.16
6	92.59
7	108.03
8	123.46
9	138.89

Conversion of Grains into Grammes.

Grains.	Grammes.
1	.0648
2	.1296
3	.1944
4	.2592
5	.3240
6	.3888
7	.4536
8	.5184
9	.5832

Conversion of Grammes into Troy Ounces.

Grammes.	Troy Ounces.
1	.03215
2	.06430
3	.09645
4	.12860
5	.16075
6	.19290
7	.22505
8	.25720
9	.28935

Conversion of Troy Ounces into Grammes.

Troy Ounces.	Grammes.
1	31.103
2	62.207
3	93.310
4	124.414
5	155.517
6	186.621
7	217.724
8	248 828
9	279.931

Conversion of Grammes into Avoirdupois Ounces.

Grammes.	Avoirdupois Ounces.
1	.03527
2	.07054
3	.10581
4	.14108
5	.17635
6	.21162
7	.24689
8	.28216
9	.31743

Conversion of Avoirdupois Ounces into Grammes.

Avoirdupois Ounces.	Grammes.
1	28.349
2	56.699
3	85.048
4	113.398
5	141.747
6	170.097
7	198.446
8	226.796
9	255.145

The use of the tables will be best illustrated by an example. Supposing that it is desired to find the equivalent in grains of 324.51 grammes, we proceed by breaking up this number into the following series of constituent parts, and finding the grain-equivalent of each part from the table.

Portions of original number.	Equivalents in grains.
300.	4630.
20.	308.6
4.	61.73
.50	7.716
.01	.1524
	5008.1984

The required quantity is 5008.2 grains. The numbers taken from the table will, in most cases, require a change as regards the position of the decimal point; thus, to find the value of 300 grammes, one refers to the table and finds 46.30 given as the equivalent, and a mere shifting of the decimal point two places towards the right multiplies this by 100, or gives the required number. In a similar manner, by shifting the decimal place of 30.86 one place to the right, we obtain the value in grains of 20 grammes; while the number 61.73 is taken from the table without alteration as the equivalent of 4 grammes. For .50 the table number must have its point shifted to the left, making it 7.716 instead of 77.16; and finally the value of .01 is obtained by shifting the point of 15.43 two places to the left.

No. 11.

	Ammonium Bromide.	Potassium Bromide.	Sodium Bromide.	Cadmium Bromide (Coml.)	Cadmium Bromide (Anhyd.).	Zinc Bromide.	Ammonium Chloride.	Sodium Chloride.	Ammonium Iodide.	Potassium Iodide.	Sodium Iodide.	Cadmium Iodide.
Ammonium bromide	1	.823	.951	.57	.72	.87	1.832	1.675	.676	.59	.653	.535
Potassium "	1.215	1	1.156	.692	.876	1.058	2.226	2.036	.821	.717	.794	.651
Sodium "	1.051	.865	1	.599	.757	.915	1.925	1.761	.71	.62	.686	.563
Cadmium " com.	1.755	1.444	1.67	1	1.265	1.527	3.215	2.94	1.186	1.035	1.146	.94
" " anh.	1.387	1.141	1.32	.79	1	1.207	2.542	2.324	.938	.819	.906	.743
Zinc "	1.149	.945	1.093	.655	.828	1	2.104	1.925	.776	.678	.75	.615
Ammonium chloride	.546	.449	.519	.311	.393	.475	1	.914	.369	.322	.356	.292
Sodium "	.597	.491	.568	.34	.43	.519	1.093	1	.403	.352	.39	.319
Ammonium iodide	1.479	1.217	1.408	.843	1.066	1.287	2.712	2.478	1	.873	.966	.792
Potassium "	1.695	1.394	1.612	.965	1.221	1 475	3.104	2.829	1.145	1	1.107	.907
Sodium "	1.53	1.259	1.456	.872	1.103	1.332	2.803	2.564	1.034	.903	1	.819
Cadmium "	1.867	1.536	1.776	1.064	1.345	1.625	3.42	3.128	1.262	1.102	1.22	1

Table No. II gives in separate columns the relative converting values of each of the soluble haloid salts in ordinary use, showing how much of any salt must be used to replace one grain of any other. In each column will be found a unit (printed in large type) which represents one grain of the salt named at the head of the column; the other figures in the same column show the exact quantities of the other salts which must be used in lieu of a single grain of that particular haloid. Thus, taking the first column, which is headed "Ammonium Bromide," we find against ammonium bromide in the margin the figure 1, representing one grain of that salt. If we wish to know the relative converting power of potassium bromide, we take the number in the same column which stands against the latter salt in the margin, viz., 1.215; that is to say, 1.215 grain of potassium bromide will be required to do the same work as one.

THE SIMPLIFICATION OF EMULSION CALCULATIONS.

From British Journal of Photography Almanac.

With a view of simplifying the calculations involved in emulsion making, Mr. William Ackland has worked out some useful tables, which will enable even those most ignorant of chemical philosophy to calculate with ease and rapidity the proper quantities of silver or haloid salts in any formula. Even those who are able to perform the calculations in the recognized style will find their labors materially lightened by means of these tables, which should be kept in a convenient place for reference in every laboratory.

No. I.

	Equivalent weights.	Weight of $AgNO_3$ required to convert one grain of soluble haloid.	Weight of soluble haloid required to convert one grain $AgNO_3$.	Weight of *silver* haloid produced by one grain of *soluble* haloid.	Weight of *soluble* haloid required to produce one grain of *silver* haloid.	Weight of silver haloid produced from one grain $AgNO_3$.
Ammonium bromide	98.	1.734	.576	1.918	.521	
Potassium "	119.1	1.427	.700	1.578	.633	
Sodium "	103.	1.650	.606	1.825	.548	
Cadmium " com.	172.	.988	1.012	1.093	.915	1.106
" " anh.	136.	1.25	.800	1.382	.723	
Zinc "	112.1	1.509	.663	1.670	.600	
Ammonium chloride	53.5	3.177	.315	2.682	.373	.844
Sodium "	58.5	2.906	.344	2.453	.408	
Ammonium iodide	145.	1.172	.853	1.620	.617	
Potassium "	166.1	1.023	.977	1.415	.707	1.382
Sodium "	150.	1.133	.882	1.566	.638	
Cadmium "	183.	.929	1.076	1.284	.778	

The principal bromides, chlorides and iodides which are likely to be used in emulsions of either gelatine or collodion have been included in these tables. Table No. 1 presents to the reader, without any mystification which may be involved in equivalents, the actual weights of haloid or silver as the case may be, required to convert or combine with one grain of the other.

In order to test the utility of this table, let us suppose that it is desired to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows:

Bromide of potassium	150 grains.	Chloride of ammonium	10 grains.
Iodide of potassium	10 "	Gelatine	200 "

Now, we want to know how much silver nitrate should be employed in sensitizing this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each used, we have the following sum:

Potassium bromide	$150 \times 1.427 = 214.$	Weight of silver nitrate required.
" iodide	$10 \times 1.023 = 10.23$	
Chloride of ammonium	$10 \times 3.177 = 31.77$	
or the total quantity of silver nitrate required for full conversion	256. grains.	

THERMOMETRIC TABLES.

SHOWING THE ASSIMILATION OF THE THERMOMETERS IN USE THROUGHOUT THE WORLD.

Celsius.	Réaumur.	Fahrenheit.	Celsius.	Réaumur.	Fahrenheit.
100	80.0	212.0	49	39.2	120.2
99	79.2	210.0	48	38.4	118.4
98	78.4	208.4	47	37.6	116.6
97	77.6	206.6	46	36.8	114.8
96	76.8	204.8	45	36.0	113.0
95	76.0	203.0	44	35.2	111.2
94	75.2	201.2	43	34.8	109.4
93	74.4	199.4	42	33.6	107.6
92	73.6	197.6	41	32.8	105.8
91	72.8	195.8	40	32.0	104.0
90	72.0	194.0	39	31.2	102.2
89	71.2	192.2	38	30.4	100.4
88	70.4	190.4	37	29.6	98.6
87	69.6	188.6	36	28.8	96.8
86	68.8	186.8	35	28.0	95.0
85	68.0	185.0	34	27.2	93.2
84	67.2	183.2	33	26.4	91.4
83	66.4	181.4	32	25.6	89.6
82	65.6	179.6	31	24.8	87.8
81	64.8	177.8	30	24.0	86.0
80	64.0	176.0	29	23.2	84.2
79	63.2	174.2	28	22.4	82.4
78	62.4	172.4	27	21.6	80.6
77	61.6	170.6	26	20.8	78.8
76	60.8	168.8	25	20.0	77.0
75	60.0	167.0	24	19.2	75.2
74	59.2	165.2	23	18.4	73.4
73	58.4	163.4	22	17.6	71.6
72	57.6	161.6	21	16.8	69.8
71	56.8	159.8	20	16.0	68.0
70	56.0	158.0	19	15.2	66.2
69	55.2	156.2	18	14.4	64.4
68	54.4	154.4	17	13.6	62.6
67	53.6	152.6	16	12.8	60.8
66	52.8	150.8	15	12.0	59.0
65	52.0	149.0	14	11.2	57.2
64	51.2	147.2	13	10.4	55.4
63	50.4	145.4	12	9.6	53.6
62	49.6	143.6	11	8.8	51.8
61	48.8	141.8	10	8.0	50.0
60	48.0	140.0	9	7.2	48.2
59	47.2	138.2	8	6.4	46.4
58	46.4	136.4	7	5.6	44.6
57	45.6	134.6	6	4.8	42.8
56	44.8	132.8	5	4.0	41.0
55	44.0	131.0	4	3.2	39.2
54	43.2	129.2	3	2.4	37.4
53	42.4	127.4	2	1.6	36.5
52	41.6	125.6	1	0.8	33.8
51	40.8	123.8	0	0.0	32.0
50	40.0	122.0			

DR. SCOTT'S TABLE OF COMPARATIVE EXPOSURES.

The following table, compiled by Dr. J. A. Scott, shows the comparative value of daylight at different hours of the day and seasons of the year, and is intended for use in conjunction with that of Mr. W. K. Burton:

Table of Comparative Exposures.

Hour of Day. A.M.	Hour of Day. P.M.	June.	May, July.	April, Aug.	Mar., Sept.	Feb., Oct.	Jan., Nov.	Dec.
12		1	1	1¼	1½	2	3½	4
11	1	1	1	1¼	1½	2½	4	5
10	2	1	1	1¼	1¾	3	5	6
9	3	1	1¼	1½	2	4	*12	*16
8	4	1½	1½	2	3	*10	--	--
7	5	2	2½	3	*6	--	--	--
6	6	2½	*3	*6	--	--	--	--
5	7	*5	*6	--	--	--	--	--
4	8	*12	--	--	--	--	--	--

* The accuracy of these figures would be affected by a yellow sunset.

MR. BURTON'S TABLE OF COMPARATIVE EXPOSURES

(SLIGHTLY ALTERED).

	Sea and Sky.	Open Landscape.	Landscape and Foreground. — Buildings.	Heavy Foliage. Foreground. — Portrait out of Doors.	Portrait in Studio Light.	Portrait in Ordinary Room.	Under Trees. — Fairly Lighted Interiors.	Badly Lighted Interiors.
F 16	1/10 sec.	1/3 sec.	1 sec.	2 sec.	16 sec.	1 min.	2½ min.	½ hour.
F 32	2/5 sec.	1⅓ sec.	4 sec.	8 sec.	1 min.	4 min.	10 min.	2 hours.
F 64	1⅔ sec.	5 sec.	16 sec.	32 sec.	4 min.	16 min.	40 min.	8 hours.

ENLARGEMENTS.

From the British Journal of Photography Almanac.

FOCUS OF LENS.	TIMES OF ENLARGEMENT AND REDUCTION.							
Inches.	1 Inch.	2 Inches.	3 Inches.	4 Inches.	5 Inches.	6 Inches.	7 Inches.	8 Inches.
2	4 4	6 3	8 2¾	10 2½	12 2⅖	14 2⅓	16 2⅜	18 2¼
2½	5 5	7½ 3¾	10 3⅓	12½ 3⅛	15 3	17½ 2 11/12	20 2⅘	22½ 2 3/16
3	6 6	9 4½	12 4	15 3¾	18 3⅗	21 3½	24 3⅗	27 3⅜
3½	7 7	10½ 5¼	14 4⅔	17½ 4¾	21 4⅕	24½ 4 1/12	28 4	31½ 3 15/16
4	8 8	12 6	16 5¼	20 5	24 5⅘	28 4⅔	32 4⅞	36 4½
4½	9 9	13½ 6¾	18 6	22½ 5⅝	27 5⅖	31½ 5¼	36 5⅛	40½ 5 1/16
5	10 10	15 7½	20 6⅔	25 6¼	30 6	35 5⅚	40 5⅝	45 5⅝
5½	11 11	16½ 8¼	22 8⅛	27½ 6⅞	33 6½	38½ 6 5/12	44 6⅔	49½ 6 3/16
6	12 12	18 9	24 8	30 7½	36 7⅕	42 7	48 6⅞	54 6¾
7	14 14	21 10½	28 9⅓	35 8¾	42 8⅖	49 8⅙	56 8	63 7⅞
8	16 16	24 12	32 10⅔	40 10	48 9⅗	56 9⅓	64 9⅐	72 9
9	18 18	27 13½	36 12	45 11¼	54 10⅘	63 10½	72 10⅔	81 10⅛

The object of this table is to enable any manipulator who is about to enlarge (or reduce) a copy any given number of times, to do so without troublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accurately from its optical centre. The use of the table will be seen from the following illustration: A photographer has a *carte* to enlarge to four times its size, and the lens he intends employing is one of six inches equivalent focus. He must therefore, look for 4 on the upper horizontal line, and for 6 in the first vertical column, and carry his eye to where these two join, which will be at 30—7½. The greater of these is the distance the sensitive plate must be from the centre of the lens; and the lesser, the distance of the picture to be copied. To *reduce* a picture any given number of times the same method must be followed, but in this case the greater number will represent the distance between the lens and the picture to be copied; the latter, that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction.

If the focus of the lens be twelve inches, as this number is not in the column of focal lengths, look out for 6 in this column and multiply by 2, and so on with any other numbers.

COMPARATIVE EXPOSURES FOR ENLARGING AND REDUCING.

Compiled by Mr. E. Ferrero, (Camera Club, London).

f/16	*f*/18	*f*/20	*f*/22	*f*/24	*f*/26	*f*/28	*f*/32	*f*/36	*f*/40	*f*/44	*f*/48	*f*/52
m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
0 9	0 11	0 14	0 17	0 20	0 23	0 27	0 36	0 45	0 55	1 7	1 20	1 34
0 13	0 16	0 21	0 25	0 30	0 34	0 40	0 54	1 7	1 23	1 41	2 0	2 20
0 18	0 22	0 28	0 32	0 40	0 46	0 54	1 12	1 30	1 51	2 15	2 40	3 7
0 22	0 28	0 35	0 42	0 50	0 58	1 8	1 30	1 52	2 18	2 48	3 20	3 54
0 27	0 33	0 42	0 50	1 0	1 9	1 21	1 48	2 15	2 46	3 22	4 0	4 40
0 36	0 45	0 55	1 15	1 19	1 33	1 48	2 24	3 0	3 42	4 29	5 20	6 15
0 45	0 55	1 10	1 24	1 40	1 54	2 15	3 0	3 42	4 37	5 36	6 40	7 48
0 55	1 6	1 23	1 38	1 59	2 18	2 42	3 36	4 30	5 33	6 44	8 0	9 21
1 3	1 18	1 37	1 54	2 19	2 42	3 9	4 12	5 15	6 28	7 52	9 20	10 55
1 12	1 30	1 50	2 10	2 38	3 7	3 36	4 48	6 0	7 24	8 58	10 40	12 30
1 21	1 40	2 5	2 30	2 59	3 29	4 4	5 24	6 42	8 19	10 5	12 0	14 3
1 30	1 50	2 20	2 50	3 20	3 48	4 30	6 0	7 22	9 12	11 12	13 20	15 36
1 48	2 12	2 46	3 16	4 0	4 36	5 24	7 12	8 52	11 5	13 28	16 0	18 40
2 6	2 35	3 13	3 48	4 37	5 23	6 18	8 24	10 30	12 56	15 43	18 40	21 50
2 24	3 0	3 40	4 20	5 17	6 14	7 12	9 36	12 0	14 48	17 55	21 20	25 0
2 42	3 20	4 10	4 58	5 58	6 58	8 7	10 48	13 24	16 36	20 10	24 0	28 6
3 0	3 40	4 40	5 36	6 40	7 36	9 0	12 0	14 44	18 25	22 24	26 40	31 12
3 22	4 10	5 15	6 18	7 30	8 33	10 10	13 30	16 36	20 48	25 12	30 0	35 10
3 45	4 36	5 50	7 0	8 19	9 30	11 15	15 0	18 24	23 0	28 0	33 20	39 4
4 7	5 5	6 25	7 42	9 9	10 27	12 27	16 30	20 18	25 20	30 48	36 40	42 57
4 30	6 30	7 0	8 24	10 0	11 24	13 30	18 0	22 6	27 40	33 36	40 0	46 54

COMPARATIVE EXPOSURES FOR ENLARGING AND REDUCING—*Continued.*

f/56	*f*/60	*f*/64	*f*/68	*f*/72	*f*/76	*f*/80	*f*/84	*f*/88	*f*/92	*f*/96	*f*/100
m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
1 48	2 5	2 22	2 40	3 0	3 20	3 42	4 4	4 28	4 54	5 20	5 47
2 42	3 7	3 33	4 0	4 30	5 0	5 33	6 6	6 42	7 21	8 0	8 40
3 37	4 10	4 44	5 20	6 0	6 40	7 24	8 9	8 57	9 48	10 40	11 33
4 30	5 17	5 55	6 40	7 30	8 21	9 15	10 9	11 12	12 17	13 20	14 27
5 25	6 15	7 5	8 0	9 0	10 1	11 6	12 12	13 25	14 42	16 0	17 20
7 12	8 20	9 28	10 40	12 0	13 22	14 48	16 17	17 54	19 36	21 20	23 7
9 0	10 34	11 50	13 22	15 0	16 42	18 30	20 21	22 23	24 33	26 40	28 54
10 50	12 30	14 10	16 1	18 0	20 2	22 12	24 25	26 50	29 24	32 0	34 40
12 40	14 34	16 33	18 42	21 0	23 23	25 54	28 30	31 19	34 18	37 20	40 27
14 24	16 48	18 55	21 22	24 0	26 43	29 36	32 33	35 48	39 12	42 40	46 15
16 12	18 45	21 18	24 3	27 0	30 3	33 18	36 38	40 17	44 10	48 0	52 0
18 0	21 8	23 40	26 44	30 0	33 24	37 0	40 42	44 46	48 56	53 20	57 48
21 40	24 58	28 21	32 0	36 0	40 5	44 24	48 50	53 40	58 48	64 0	69 0
25 20	29 7	33 6	37 23	42 0	46 45	51 48	57 0	62 39	69 0	74 40	81 0
28 48	33 17	37 50	42 43	48 0	53 27	59 12	65 7	71 36	78 0	85 0	92 0
32 36	37 30	42 35	48 5	54 0	60 6	66 36	73 15	80 20	88 0	96 0	104 0
36 0	42 17	47 20	53 28	60 0	66 47	74 0	81 24	89 0	98 0	106 0	116 0
40 48	46 50	53 15	60 20	67 27	75 8	83 15	91 31	100 0	110 0	120 0	130 0
45 0	52 50	59 10	66 40	74 55	83 30	92 30	101 38	111 0	122 0	133 0	144 0
49 51	58 13	65 5	73 30	82 25	91 0	101 45	111 45	124 0	135 0	146 0	159 0
54 0	63 26	71 0	80 0	89 55	100 10	111 0	122 6	134 0	147 0	160 0	174 0



Photographed by GEO. STECKEL.
Engraved by
ELECTRO LIGHT ENGRAVING CO.,
New York, N. Y.

STUDIO WORK.

DR. WOODMAN'S TABLE OF VIEW ANGLES.

DIVIDE THE BASE OF THE PLATE BY THE EQUIVALENT FOCUS OF THE LENS.

If the quotient is	The angle is	If the quotient is	The angle is	If the quotient is	The angle is
	Degrees.		Degrees.		Degrees.
.282	16	.748	41	1.3	66
.3	17	.768	42	1.32	67
.317	18	.788	43	1.36	68
.335	19	.808	44	1.375	69
.353	20	.828	45	1.4	70
.37	21	.849	46	1.427	71
.389	22	.87	47	1.45	72
.407	23	.89	48	1.48	73
.425	24	.911	49	1.5	74
.443	25	.933	50	1.53	75
.462	26	.854	51	1.56	76
.48	27	.975	52	1.59	77
.5	28	1.	53	1.62	78
.517	29	1.02	54	1.649	79
.536	30	1.041	55	1.678	80
.555	31	1.063	56	1.7	81
.573	32	1.086	57	1.739	82
.592	33	1.108	58	1.769	83
.611	34	1.132	59	1.8	84
.631	35	1.155	60	1.833	85
.65	36	1.178	61	1.865	86
.67	37	1.2	62	1.898	87
.689	38	1.225	63	1.931	88
.708	39	1.25	64	1.965	89
.728	40	1.274	65	2.	90

This table has been calculated for the use of those who wish to know the precise *angle of view* included by any particular lens on a given size of plate. Its mode of use will be easily seen by inspection.

SIZES OF DRY PLATES MADE IN FRANCE AND GERMANY.

6½	× 9	c. m.	2.5 × 3.6	inches.	21 × 29	c. m.	8.2 × 10.6 inches.
9	× 12	"	3.6 × 4.7	"	24 × 30	"	9.4 × 11.8 "
12	× 15	"	4.7 × 5.9	"	27 × 33	"	10.6 × 12.9 "
13	× 18	"	5.1 × 7.0	"	27 × 35	"	10.6 × 13.7 "
12	× 20	"	4.7 × 7.8	"	30 × 40	"	11.8 × 15.7 "
15	× 21	"	5.9 × 8.2	"	40 × 50	"	15.7 × 19.6 "
15	× 22	"	5.9 × 8.6	"	50 × 60	"	19.6 × 23.6 "
18	× 24	"	7.2 × 9.4	"			

SIZES OF DRY PLATES MADE IN ITALY.

9	× 12	c. m.	3.6 × 4.9	inches.	21 × 29	c. m.	8.2 × 10.6 inches.
12	× 16	"	4.7 × 6.3	"	24 × 30	"	9.4 × 11.8 "
12	× 18	"	4.7 × 7.2	"	29 × 33	"	10.6 × 12.0 "
13	× 18	"	5.1 × 7.0	"	30 × 36	"	11.8 × 14.1 "
12	× 20	"	4.7 × 7.8	"	40 × 50	"	15.7 × 19.6 "
18	× 24	"	7.0 × 9.4	"	50 × 60	"	19.6 × 23.6 "

EQUATIONS RELATING TO FOCI, ETC.

The following simple optical formulæ and calculations, worked out by Mr. J. A. C. Branfill, will prove useful in many branches of photography, especially where several lenses of varying foci are in constant use for a variety of purposes:

Let p = Principal focus.
F = Greater conjugate do.
f = Lesser do. do.
$D = F + f$ = distance of image from object.
r = Ratio of any dimension in original to the same dimension in copy (in case of reduction), or *vice versa* (in case of enlargement).
a = Effective diameter of diaphragm.
U. S. No. = "Uniform System" No. of do.
x = Comparative exposure required.

Then

$$p = D \times \frac{r}{(r+1)^2} = \frac{Ff}{D} = \frac{F}{r+1} = \frac{rf}{r+1}$$

$$F = p(r+1) = \frac{pf}{f-p} = rf = \frac{rD}{r+1}$$

$$f = p \times \frac{(r+1)}{r} = \frac{pF}{F-p} = \frac{D}{r+1} = \frac{F}{r}$$

$$D = p \times \frac{(r+1)^2}{r} = f(r+1) = p\left(2 + r + \frac{1}{r}\right)$$

$$r = \frac{F-p}{p} = \frac{p}{f-p} = \frac{F}{f}$$

$$\text{U. S. No.} = \frac{p^2}{16\,a^2}$$

$$x = \frac{f^2}{16\,a^2} = \frac{p^2}{16\,a^2} \times \frac{(r+1)^2}{r^2}$$

N. B.—For ordinary landscape work, where r is greater than 20, x may be taken as $\frac{p^2}{16\,a^2}$

NOTE.—In case the above may not be clear to some photographers, the following rules may be better understood:

To find the principal focus of a lens (p), focus a near object in the camera, and measure the distance between it and the ground-glass (D); next find the proportion which any dimension in the object bears to the same dimension on the ground-glass (r). Thus, if the original dimension be four times as large as its reproduction, we say that r equals (=) 4. Multiply D by r, and divide the product by the square of a number greater by one than r ($r+1)^2$. This rule was lately published by Mr. Debenham.

To find the lesser conjugate focus (f) (if p and r are known) multiply p by the sum of $r+1$ and divide the product by r. Or divide D by $r+1$.

To find the greater conjugate focus (F) multiply p by $r+1$. Or multiply f by r.

To find D (the distance which the ground-glass should be from the object to be copied in order to get a given value for r) multiply p by the sum of $r + \frac{1}{r} + 2$.

To find r divide $F-p$ (the difference between F and p) by p. Or divide p by $f-p$. Or divide F by f.

To find x divide the square of f by 16 times the square of a (the diameter of aperture to lens).

For example: Focus an object which is five inches high, so that it is one inch high on the ground-glass; thus we know that $r = 5$. Next measure the distance between the object and the ground-glass (D), which is found to be 45 inches.

Then $p = 45 \times$ (multiplied by) $5 \div$ (divided by) $6 \times 6 = 6\frac{1}{4}$ inches.
$f = 5\frac{1}{4} \times 6 \div 5 = 7\frac{1}{2}$ inches. Or $f = 45 \div 6 = 7\frac{1}{2}$ inches.
$F = 6\frac{1}{4} \times 6 = 37\frac{1}{2}$ inches. Or $F = 7\frac{1}{2} \times 5 = 37\frac{1}{2}$ inches.
$D = 6\frac{1}{4} \times (5 + \frac{1}{5} + 2) = 6\frac{1}{4} \times 7\frac{1}{2} = 45$ inches.
$r = (37\frac{1}{2} - 6\frac{1}{4}) \div 6\frac{1}{4} = 5$. Or $r = 6\frac{1}{4} \div (7\frac{1}{2} - 6\frac{1}{4}) = 5$.

ELSDEN'S TABLE OF POISON AND ANTIDOTES.

	Poisons.	Remarks.	Characteristic Symptoms.	Antidotes.
Vegetable Acids....	OXALIC ACID..... including POTASSIUM OXALATE.	1 drachm is the smallest fatal dose known.	Hot burning sensation in throat and stomach; vomiting, cramps, and numbness	Chalk, whiting or magnesia suspended in water. Plaster or mortar can be used in emergency.
Caustic Alkalies....	AMMONIUM " POTASSIUM " SODIUM "	Vapor of ammonia may cause inflammation of the lungs.	Swelling of tongue, mouth and fauces; often followed by stricture of the œsophagus.	Vinegar and water.
Metallic Salts.....	MERCURIC CHLORIDE.....	3 grains the smallest known fatal dose.	Acid, metallic taste, constriction and burning in throat and stomach, followed by nausea and vomiting.	White and yolk of raw eggs with milk. In emergency, flour paste may be used.
	ACETATE OF LEAD.....	The sub-acetate is still more poisonous.	Constriction in the throat and at pit of stomach; crampy pains and stiffness of abdomen; blue line round the gums.	Sulphates of soda or magnesia. Emetic of sulphate of zinc.
	CYANIDE OF POTASSIUM...	*a.* Taken internally, 3 grs. fatal.	Insensibility, slow gasping respiration, dilated pupils and spasmodic closure of the jaws.	No certain remedy; cold affusion over the head and neck most efficacious.
		b. Applied to wounds and abrasures of the skin.	Smarting sensation.	Sulphate of iron should be applied immediately.
	BICHROMATE OF POTASSIUM	*a.* Taken internally. *b.* Applied to slight abrasions of the skin.	Irritant pain in stomach and vomiting. Produces troublesome sores and ulcers.	Emetics and magnesia, or chalk.
	NITRATE OF SILVER.....		Powerful irritant.	Common salt to be given immediately, followed by emetics.
Concentrated Mineral Acids..	NITRIC ACID.....	2 drachms have been fatal. Inhalation of the fumes has also been fatal.	Corrosion of windpipe, and violent inflammation.	Bicarbonate of soda, or carbonate of magnesia or chalk; plaster of the apartment beaten up in water.
	HYDROCHLORIC ACID.....	½ ounce has caused death.		
	SULPHURIC ACID.....	1 drachm has been fatal.		
	ACETIC ACID, concentrated, has as powerful an effect as the mineral acids.			
	IODINE	Variable in its action; 3 grains have been fatal.	Acrid taste, tightness about the throat, vomiting.	Vomiting should be encouraged, and gruel, arrow-root and starch given freely.
	PYROGALLOL.....	2 grains sufficient to kill a dog.	Resemble phosphorus poisoning.	No certain remedy. Speedy emetic desirable.

Specific Gravities of Mixtures of Different Proportions of Alcohol (s. g. .7932) and Water, by Weight and by Volume, at 14° R. (63.5° F.).—MEISSNER.

Parts of Alcohol.	Parts of Water.	Specific Gravity of Mixture by Weight.	Specific Gravity of Mixture by Volume.	Parts of Alcohol.	Parts of Water.	Specific Gravity of Mixture by Weight.	Specific Gravity of Mixture by Volume.
100	0	0.7932	0.7932	49	51	0.9196	0.9324
99	1	0.796	0.7969	48	52	0.9219	0.9344
98	2	0.7988	0.8006	47	53	0.9242	0.9364
97	3	0.8016	0.8042	46	54	0.9264	0.9384
96	4	0.8045	0.8078	45	55	0.928	0.9404
95	5	0.8074	0.8114	44	56	0.9308	0.9424
94	6	0.8104	0.815	43	57	0.9329	0.9443
93	7	0.8135	0.8185	42	58	0.9350	0.9461
92	8	0.8166	0.8219	41	59	0.9371	0.9478
91	9	0.8196	0.8253	40	60	0.9391	0.9495
90	10	0.8225	0.8286	39	61	0.9410	0.9512
89	11	0.8252	0.8317	38	62	0.9429	0 9529
88	12	0.8279	0.8346	37	63	0.9448	0.9547
87	13	0.8304	0.8373	36	64	0.9467	0.9564
86	14	0.8329	0.840	35	65	0.9486	0.958
85	15	0.8353	0.8427	34	66	0.9505	0.9595
84	16	0.8376	0.8454	33	67	0.9524	0.9609
83	17	0.8399	0.8481	32	68	0.9543	0.9621
82	18	0.8422	0.8508	31	69	0.9561	0.9632
81	19	0.8446	0.8534	30	70	0.9578	0.9643
80	20	0.847	0.8561	29	71	0.9594	0.9654
79	21	0.8494	0.8596	28	72	0.9608	0.9665
78	22	0.8519	0.8616	27	73	0.9621	0.9676
77	23	0.8543	0.8642	26	74	0.9634	0.9688
76	24	0.8567	0.8668	25	75	0.9647	0.970
75	25	0.859	0.8695	24	76	0.966	0.9712
74	26	0.8613	0.8723	23	77	0.9673	0.9723
73	27	0.8635	0.8751	22	78	0.9686	0.9734
72	28	0.8657	0.8779	21	79	0.9699	0.9745
71	29	0.868	0.8806	20	80	0.9712	0.9756
70	30	0.8704	0.8833	19	81	0.9725	0.9766
69	31	0.8729	0.886	18	82	0.9738	0.9775
68	32	0.8755	0.8885	17	83	0.9751	0.9784
67	33	0.8781	0.891	16	84	0.9763	0.9793
66	34	0.8806	0.8934	15	85	0.9795	0.9803
65	35	0.8831	0.8958	14	86	0.9786	0.9813
64	36	0.8855	0.8982	13	87	0.9796	0.9823
63	37	0.8879	0.9006	12	88	0.9806	0.9834
62	38	0.8902	0.9029	11	89	0.9817	0.9846
61	39	0.8925	0.9052	10	90	0.9830	0.9859
60	40	0.8948	0.9075	9	91	0.9844	0.9873
59	41	0.8971	0.9098	8	92	0.9860	0.9888
58	42	0.8994	0.9121	7	93	0.9873	0.9901
57	43	0.9016	0.9145	6	94	0.9897	0.9915
56	44	0.9038	0.9168	5	95	0.9914	0.9929
55	45	0.9060	0.9191	4	96	0.9931	0.9943
54	46	0.9082	0.9124	3	97	0.9948	0.9957
53	47	0.9104	0.9237	2	98	0.9965	0.9971
52	48	0.9127	0.9159	1	99	0.9982	0.9985
51	49	0.915	0.9281	0	100	1.0000	1.0000
50	50	0.6173	0.9303	--	--	--	--

SOLUBILITY OF CHLORIDE OF SILVER IN SOLUTIONS OF VARIOUS SALTS.

(*H. Hahn.*)

	Per Cent. of the Solution.	Saturated at	Per Cent. of Silver Chloride Dissolved.	Per Cent. of Silver.	Sp. Gr.	Temperature.	Number of Grams of Silver in 100 c. c.
Potassium chloride	24.95	19.6°	0.0776	0.0584	1.1774	19.6°	0.0688
Sodium "	25.96	"	0.1053	0.0793	1.2053	"	0.0956
Ammonium "	28.45	24.5°	0.3397	0.2551	1.0835	30.0°	0 2764
Calcium "	41.26	"	0.5713	4.4300	1.4612	"	0.6283
Magnesium "	36.35	"	0.5313	0.3999	1.3350	"	0.5339
Barium "	27.32	"	0.0570	0.0429	1.3017	"	0.0558
Ferrous "	30.70	—	0.1686	0.1269	1.4199	20.0°	0.1802
Ferric "	37.48	—	0.0058	0.0044	1.4472	21.4°	0.0064
Manganous "	43.85	24.5°	0.1996	0.1499	1.4851	30.0°	0.2226
Zinc "	53.34	—	0.0134	0.0101	1.6005	"	0.0162
Cuprous "	44.48	24.5°	0.0532	0.0399	1.5726	"	0.0627
Lead "	0.99	"	0.0000	0.0000	1.0094	"	0.0000

SOLUBILITY OF SILVER CHLORIDE IN SOLUTIONS OF SODIUM SULPHITE OF VARIOUS DEGREES OF CONCENTRATION.

(*W. de W. Abney.*)

Strength of Sodium Sulphite Solution.	Grams of Silver Chloride Dissolved per 100 c. c.
1.04 grams per 100 c. c. of water.	0.007
2.08 " " " "	0.020
4.16 " " " "	0.070
6.24 " " " "	0.110
8.35 " " " "	0.150
16.70 " " " "	0.310
20.83 " " " "	0.400

SOLUBILITY OF SILVER CHLORIDE IN SOLUTIONS OF SODIUM THIOSULPHATE OF VARIOUS DEGREES OF CONCENTRATION.

(*W. de W. Abney.*)

Strength of Sodium Thiosulphate Solution.	Grams of Silver Chloride Dissolved per 100 c. c.
2.08 grams per 100 c. c. of water.	0.29
4.16 " " " "	0.64
6.24 " " " "	0.88
8.35 " " " "	1.26
16.70 " " " "	2.54
20.83 " " " "	3.28

EQUIVALENT WEIGHTS OF CERTAIN SILVER COMPOUNDS, ETC.

By A. H. Elliott, Ph.D.

One part of silver, or one part of silver nitrate, is equal to the following parts of other combinations:

	Silver Chloride.	Silver Bromide.	Silver Iodide.	Potassium Chloride.	Potassium Bromide.
Silver	1.328	1.740	2.176	.690	1.102
Silver Nitrate.	.844	1.106	1.382	.439	.701

	Potassium Iodide.	Sodium Chloride.	Sodium Bromide.	Sodium Iodide.	Ammonium Chloride.
Silver	1.538	.541	.953	1.388	.495
Silver Nitrate.	.971	.344	.606	.882	.315

	Ammonium Bromide.	Ammonium Iodide.	Cadmium Chloride.	Cadmium Bromide.	Cadmium Iodide.
Silver	.907	1.342	1.363	1.776	2.211
Silver Nitrate.	.576	.853	.538	.800	1.076

EQUIVALENT WEIGHTS OF CERTAIN GOLD COMPOUNDS.

(*Eder's Year Book of Photography.*)

Gold.	Gold Chloride (Anhyd.)	Gold Chloride (Crystallized.)	Double Chloride of Gold and Potassium.	Double Chloride of Gold and Sodium.	Double Chloride of Gold and Calcium.	Fizeau's Salt.
1	1.540	1.814	2.148	2.020	2.096	2.670
0.649	1	1.178	1.394	1.310	1.360	1.700
0.554	0.849	1	1.183	1.113	1.155	1.471
0.465	0.717	0.844	1	0.941	0.976	1.219
0.494	0.762	0 898	1.062	1	1.037	1.321
0.477	0.735	0.869	1.024	1.963	1	1.273
0.374	0.575	0.679	0.804	0.757	0.781	1

ACETIC ACID.

Quantities of crystallizable acid in mixtures of acetic acid and water of various densities at 15° C.

Parts of Crystallizable Acid in 100.	Specific Gravity.	Parts of Crystallizable Acid in 100.	Specific Gravity.	Parts of Crystallizable Acid in 100.	Specific Gravity.	Parts of Crystallizable Acid in 100.	Specific Gravity.
100	1.0553	75	1.0746	50	1.0615	25	1.0350
99	1.0580	74	1.0744	49	1.0607	24	1.0337
98	1.0604	73	1.0742	48	1.0598	23	1.0324
97	1.0625	72	1.0740	47	1.0589	22	1 0311
96	1.0644	71	1.0737	46	1.0580	21	1.0298
95	1.0660	70	1.0733	45	1.0571	20	1.0284
94	1.0674	69	1.0729	44	1.0562	19	1.0270
93	1.0686	68	1.0725	43	1.0552	18	1.0256
92	1.0696	67	1.0721	42	1.0543	17	1.0242
91	1.0705	66	1.0717	41	1.0533	16	1.0228
90	1.0713	65	1.0712	40	1.0523	15	1.0214
89	1.0720	64	1.0707	39	1.0513	14	1.0201
88	1.0726	63	1.0702	38	1.0502	13	1.0185
87	1.0731	62	1.0697	37	1.0492	12	1.0171
86	1.0736	61	1.0691	36	1.0481	11	1.0157
85	1.0739	60	1.0685	35	1.0470	10	1.0142
84	1.0742	59	1.0679	34	1.0459	9	1.0127
83	1.0744	58	1.0673	33	1.0447	8	1.0113
82	1.0746	57	1.0666	32	1.0436	7	1.0098
81	1.0747	56	1.0660	31	1.0424	6	1.0083
80	1.0748	55	1.0653	30	1.0412	5	1.0067
79	1.0748	54	1.0646	29	1.0400	4	1.0052
78	1.0748	53	1.0638	28	1.0388	3	1.0037
77	1.0748	52	1.0631	27	1.0375	2	1.0022
76	1.0747	51	1.0628	26	1.0363	1	1.0007

N. B.—The density of the mixture increases until nearly 25 % of water is present, after which it again decreases. Acetic acid is, therefore, better tested volumetrically with a standard solution of alkali.

SULPHUROUS ACID.

Quantities of anhydrous sulphurous acid in solutions of different densities.

(*F. Authon.*)

Specific Gravity.	Anhydrous Acid in 100.	Specific Gravity.	Anhydrous Acid in 100.	Specific Gravity.	Anhydrous Acid in 100.	Specific Gravity.	Anhydrous Acid in 100.
1.046	9.54	1.027	6.68	1.020	4.77	1.012	2.86
1.036	8.59	1.023	5.72	1.016	3.82	1.009	1.90
1.031	7.63					1.005	0.95

DENSITIES OF WATER SOLUTIONS OF ALBUMEN AT 15.5° CELSIUS.

(*Eder's Year Book of Photography.*)

Per Cent. Albumen.	° Bé.	Sp. Gr.	Per Cent. Albumen.	° Bé.	Sp. Gr.	Per Cent. Albumen.	° Bé.	Sp. Gr.
1	0.37	1.0026	15	5.32	1.0384	40	13.78	1.1058
2	0.77	1.0054	20	7.06	1.0515	45	15.48	1.1204
3	1.12	1.0078	25	8.72	1.0644	50	17.16	1.1352
5	1.85	1.0130	30	10.42	1.0780	55	18.90	1.1511
10	3.66	1.0261	35	12.12	1.0919			

DENSITIES OF VARIOUS MIXTURES OF ALCOHOL AND ETHER AT 15° CELSIUS.

(*Eder's Year Book of Photography.*)

Per Cent. Alcohol 0.809 Sp. Gr.	Sp. Gr.	Per Cent. Alcohol 0.809 Sp. Gr.	Sp. Gr.
0	0.729	60	0.779
10	0.737	70	0.786
20	0.747	80	0.798
30	0.756	90	0.801
40	0.765	100	0.809
50	0.772		

DENSITIES OF WATER SOLUTIONS OF CUPRIC CHLORIDE AT 17.5° CELSIUS.

(*Franz.*)

Sp. Gr.	Per Cent. $Cu Cl_2$.	Sp. Gr.	Per Cent. $Cu Cl_2$.	Sp. Gr.	Per. Cent. $Cu Cl_2$.
1.0182	2	1.1696	16	1.3618	30
1.0364	4	1.1958	18	1.3950	32
1.0548	6	1.2223	20	1.4287	34
1.0734	8	1.2501	22	1.4615	36
1.0920	10	1.2779	24	1.4949	38
1.0178	12	1.3058	26	1.5284	40
1.1436	14	1.3338	28		



Photographed by MORRISON.
Engraved by
SUFFOLK ENGRAVING CO.,
Boston, Mass.

STUDIO WORK.

DENSITIES OF WATER SOLUTIONS OF FERRIC CHLORIDE AT 17.5° CELSIUS.

(*Franz.*)

Sp. Gr.	Per Cent. Fe_2Cl_6.	Sp. Gr.	Per Cent. Fe_2Cl_6.	Sp. Gr.	Per Cent. Fe_2Cl_6.
1.0146	2	1.1746	22	1.3870	42
1.0292	4	1.1950	24	1.4118	44
1.0439	6	1.2155	26	1.4367	46
1.0587	8	1.2365	28	1.4617	48
1.0734	10	1.2568	30	1.4867	50
1.0894	12	1.2778	32	1.5153	52
1.1054	14	1.2988	34	1.5439	54
1.1215	16	1.3199	36	1.5720	56
1.1378	18	1.3411	38	1.6023	58
1.1542	20	1.3622	40	1.6317	60

DENSITIES OF WATER SOLUTIONS OF SILVER NITRATE AT 16° CELSIUS.

(*Dawson.*)

°Tw.	°Bé.	Sp. Gr.	Per Cent. $AgNO_3$.	°Tw.	°Bé.	Sp. Gr.	Per Cent. $AgNO_3$.	°Tw.	°Bé.	Sp. Gr.	Per Cent. $AgNO_3$.
4	2.7	1.021	2.08	19	12.4	1.097	10.41	34	20.9	1.172	18.75
8	5.4	1.040	4.16	23	14.9	1.116	12.50	38	23.0	1.191	20.83
12	8.0	1.059	6.24	27	17.1	1.135	14.58	42	25.0	1.209	22.91
16	10.6	1.078	8.35	30	18.8	1.152	16.66	45	26.4	1.227	25.00

DENSITIES OF WATER SOLUTIONS OF CHROME ALUM.

(*Franz.*)

Sp. Gr.	Per Cent.	Sp. Gr.	Per Cent.
1.0174	5	1.1896	40
1.0342	10	1.2894	50
1.0746	20	1.4566	60
1.1274	30	1.6362	70

DENSITIES OF WATER SOLUTIONS OF CERTAIN ALKALINE IODIDES AT 20° CELSIUS.

(*Gerlach.*)

Per Cent.	Potassium Iodide.	Lithium Iodide.	Sodium Iodide.	Barium Iodide.	Calcium Iodide.	Strontium Iodide.	Magnesium Iodide.
5	1.038	1.038	1.040	1.045	1.044	1.045	1.043
10	1.078	1.079	1.082	1.091	1.090	1.091	1.088
15	1.120	1.124	1.128	1.143	1.140	1.142	1.139
20	1.166	1.172	1.179	1.201	1.198	1.200	1.194
25	1.218	1.224	1.234	1.265	1.260	1.262	1.254
30	1.271	1 280	1.294	1.333	1.321	1.330	1.320
35	1.331	1.344	1.360	1.412	1.398	1.410	1.395
40	1.396	1.414	1.432	1.495	1.477	1.491	1.474
45	1.469	1.489	1.510	1.596	1.567	1.590	1.553
50	1.546	1.575	1.600	1.704	1.665	1.695	1.688
55	1.636	1.670	1.700	1.825	1.780	1.812	1.780
60	1.734	1.777	1.810	1.970	1.910	1.955	1.915
65						2.150	

DENSITIES OF WATER SOLUTIONS OF SODIUM CHLORIDE AT 20° CELSIUS.

(*Schiff.*)

Per Cent.	°Tw.	°Bé.	Sp. Gr.	Per Cent.	°Tw.	°Bé.	Sp. Gr.	Per Cent.	°Tw.	°Bé.	Sp. Gr.	Per Cent.	°Tw.	°Bé.	Sp. Gr.	Per Cent.	°Tw.	°Bé.	Sp. Gr.
1	1	0.7	1.0066	7	10	6.7	1.0483	13	19	12.4	1.0934	19	28	17.7	1.1408	25	38	23.0	1.1906
2	3	2.1	1.0133	8	11	7.4	1.0556	14	20	13.0	1.1012	20	30	18.8	1.1490	26	40	24.0	1.1990
3	4	2.7	1.0201	9	13	8.7	1.0630	15	22	14.2	1.1090	21	31	19.3	1.1572	27	41	24.5	1.2075
4	5	3.4	1.0270	10	14	9.4	1.0705	16	23	14.9	1.1168	22	33	20.3	1.1655	..	..	..	..
5	7	4.7	1.0340	11	16	10.6	1.0781	17	25	16.0	1.1247	23	35	21.4	1.1738	..	..	..	..
6	8	5.4	1.0411	12	17	11.2	1.0857	18	27	17.1	1.1327	24	36	22.0	1.1822	..	..	..	..

DENSITIES OF WATER SOLUTIONS OF AMMONIA AT 14° CELSIUS.

(Carius.)

Specific Gravity.	Percentage of Ammonia.	Specific Gravity.	Percentage of Ammonia.
0.8844	36.0	0.9314	18.0
0.8864	35.0	0.9347	17.0
0.8885	34.0	0.9380	16.0
0.8907	33.0	0.9414	15.0
0.8929	32.0	0.9449	14.0
0.8953	31.0	0.9484	13.0
0.8976	30.0	0.9520	12.0
0.9001	29.0	0.9556	11.0
0.9026	28.0	0.9593	10.0
0.9052	27.0	0.9631	9.0
0.9078	26.0	0.9670	8.0
0.9106	25.0	0.0709	7.0
0.9133	24.0	0.9749	6.0
0.9162	23.0	0.9790	5.0
0.9191	22.0	0.9831	4.0
0.9221	21.0	0.9873	3.0
0.9251	20.0	0.9915	2.0
0.9283	19.0	0.9959	1.0

DENSITIES OF SODIUM CARBONATE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon the specific gravity table of Schiff in *Chemiker Kalender*. Temperature 23° C. (73° F.). The gallon is that of the United States, and contains 133.28 ounces of water. The ounce contains 437.5 grains. The first four columns give percentage by weight and weight in 100 volumes of the crystals (10 molecules water) and dry salt respectively.

Grams of Crystals in 100 grms	Grams of Crystals in 100 c. c.	Grams of Dry Salt in 100 grms.	Grams of Dry Salt in 100 c. c.	Ounces Crystals in one gallon.	Grains Crystals in one fluid ounce.	Specific Gravity.	Degree Beaume.	Degree Twaddell.
50	60.2	18.53	22.31	80	262.5	1.204	24	40
45	53.2	16.67	19.75	71	232.	1.183	23	38
40	46.5	14.82	17.30	62	203.	1.162	20	32
35	40.0	12.97	14.83	53	174.5	1.141	18	28
30	33.6	11.12	12.32	45	147.	1.120	16	24
25	27.5	9.26	10.23	37	110.	1.099	13	20
20	21.6	7.41	8.00	29	94.5	1.079	10.5	16
15	15.9	5.56	5.83	21	69.5	1.059	8	12
10	10.4	3.70	3.85	14	45.5	1.039	5.4	8
5	5.1	1.85	1.86	7	22.3	1.019	2.7	4
2	2.0	.74	.76	3	8.8	1.008	1	1.4

DENSITIES OF POTASSIUM CARBONATE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon the specific gravity table of Gerlach in *Chemiker Kalender*. Temperature 15° C. (60° F.). The gallon is that of the United States, and contains 133.28 ounces of water. The ounce contains 437.5 grains. Dry potassium carbonate is understood in the figures given, and the first two columns give percentages by weight and weight in 100 volumes.

Grams in 100 grams.	Grams in 100 c. c.	Ounces in one gallon.	Grains in one fl. oz.	Specific Gravity.	Degree Beaume.	Degree Twaddell.
52	81.6	109.	357	1.570	53	114
50	77.2	103.	338	1.544	51	108
45	66.6	89.	291	1.480	47	96
40	56.7	76.	248	1.419	43	84
35	47.5	63.	208	1.359	38	72
30	39.0	52.	171	1.301	33	58
25	31.1	41.5	137	1.246	29	51
20	23.8	32.	105	1.193	24	40
15	17.1	23.	75	1.142	18	28
10	10.9	14.5	44	1.093	12	18
5	5.2	7.	23	1.046	7	10
2	2.0	2.7	9	1.018	2.5	3

DENSITIES OF SATURATED SOLUTIONS.

The following solutions are saturated at 60° F. and the table gives the specific gravity, degrees Beaume and Twaddell, and the percentage of salt *by weight*.

	Specific Gravity.	Degree Beaume.	Degree Twaddell.	Percentage of Salt by Weight.
Alum (Ammonia) Crystallized	1.048	7	10	11
Potassium Carbonate Dry	1.571	52	112	52
" Oxalate	1.262	30	52	25
Sodium Carbonate (10 molecules water)	1.199	24	40	49
" Hyposulphite (5 " ")	1.210	25	41	58
" Sulphite (7 " ")	1.197	24	40	35

DENSITIES OF SODIUM SULPHITE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon experiments made specially for the construction of this table, temperature 15° C. (60° F.). The gallon is that of the United States, and contains 133.28 ounces of water; the ounce contains 437.5 grains of water. Crystallized sodium sulphite with seven molecules of water is understood in the figures given, and the first two columns give percentage by weight and weight in 100 volumes.

Grams in 100 grams.	Grams in 100 c. c.	Ounces in one gallon.	Grains in one fl. oz.	Specific Gravity.	Degree Beaume.	Degree Twaddell.
35.1	42.0	54.2	184	1.1969	24	40
30	35.0	46.6	153	1.1675	21	34
25	28.5	38.0	122	1.1381	17	27
20	22.2	29.6	97	1.1087	11	17
15	16.2	21.6	61	1.0793	10.5	15
10	10.5	14.0	46	1.0499	7.0	10
5	5.1	6.8	22.3	1.0205	3.0	4
2	2.0	2.7	8.8	1.0100	2.0	2

DENSITIES OF HOT SOLUTIONS FOR OBTAINING CRYSTALS OF THE FOLLOWING SUBSTANCES ON COOLING.

Substance.	°Bé.	Substance.	°Be.
Acetate of Lead	42	Chloride of Calcium	40
" " Sodium	22	" " Copper	45
Oxalic Acid	12	" " Magnesium	35
Ammonia Alum	20	" " Potassium	25
Potash "	20	Bichromate of Ammonia	28
Nitrate of Lead	50	" " Potash	38
" " Potash	28	Chromate of Sodium	45
" " Soda	40	Hyposulphite of Sodium	8
Barium Hydrate	12	Iodide of Potassium	60
Borax	24	Oxalate of "	30
Bromide of Ammonium	30	Permanganate of Potassium	25
" " Cadmium	65	Phosphate of Soda	20
" " Potassium	40	Sulphate of Copper	30
" " Sodium	55	" " Iron (Copperas)	31
" " Strontium	50	" " Zinc	45
Carbonate of Sodium	28	Sulphite of Soda	25
Chlorate of Potash	22	Sulphocyanide of Ammonia	18
" " Sodium	43	Neutral Tartrate of Potash	38
Chloride of Ammonium	12	Rochelle Salts	36
" " Barium	35		

DENSITIES OF WATER SOLUTIONS OF POTASH OR AMMONIA ALUM AT 17.5° CELSIUS.

(*Eder's Year Book of Photography.*)

Sp. Gr. of $K_2Al_2(SO_4)_4+24Aq.$ Solution.	Sp. Gr. of $(NH_4)_2Al_2(SO_4)_4+24Aq.$ Solution.	Per Cent.
1.0065	1.0060	1
1.0110	1.0109	2
1.0166	1.0156	3
1.0218	1.0200	4
1.0269	1.0255	5
1.0320	1.0305	6

DENSITIES OF WATER SOLUTIONS OF SULPHUROUS ACID AT 15° CELSIUS.

(*Scott.*)

Sp. Gr.	Per Cent. SO_2.	Sp. Gr.	Per Cent. SO_2.
1.0028	0.5	1.0302	5.5
1.0056	1.0	1.0328	6.0
1.0085	1.5	1.0358	6.5
1.0113	2.0	1.0377	7.0
1.0141	2.5	1.0401	7.5
1.0168	3.0	1.0426	8.0
1.0194	3.5	1.0450	8.5
1.0221	4.0	1.0474	9.0
1.0248	4.5	1.0497	9.5
1.0275	5.0	1.0520	10.0

DENSITIES OF WATER SOLUTIONS OF SODIUM HYDRATE AT 15° CELSIUS.

(*Eder's Year Book of Photography.*)

°Tw.	°Bé.	Sp. Gr.	Per Cent. NaOH.	°Tw.	°Bé	Sp. Gr.	Per Cent. NaOH.
2	1.4	1.012	1	34	20.9	1.170	15
5	3.4	1.023	2	45	26.4	1.225	20
7	4.7	1.035	3	56	31.5	1.279	25
9	6.0	1.046	4	66	35.8	1.332	30
12	8.0	1.059	5	77	40.1	1.384	35
14	9.4	1.070	6	87	43.8	1.437	40
16	10.6	1.081	7	98	47.4	1.488	45
18	11.9	1.092	8	108	50.6	1.540	50
21	13.6	1.103	9	118	53.6	1.591	55
23	14.9	1.115	10	129	56.6	1.643	60

DENSITIES OF WATER SOLUTIONS OF SODIUM THIOSULPHATE AT 20° CELSIUS.

(*Schiff.*)

°Tw.	°Bé.	Sp. Gr.	Per Cent. $Na_2S_2O_3+5Aq.$	Per Cent. $Na_2S_2O_3$.	°Tw.	°Bé.	Sp. Gr.	Per Cent. $Na_2S_2O_3+5Aq.$	Per Cent. $Na_2S_2O_3$.
5	3.4	1.0264	5	3.185	33	20.3	1.1676	30	19.118
11	7.4	1.0529	10	6.371	40	24.0	1.1986	35	22.298
16	10.6	1.0807	15	9.556	46	26.9	1.2297	40	25.484
22	14.2	1.1087	20	12.742	52	29.7	1.2624	45	28.669
28	17.7	1.1381	25	15.927	59	32.8	1.2954	50	31.855

DENSITIES OF WATER SOLUTIONS OF CERTAIN ALKALINE BROMIDES AT 20° CELSIUS.

(*Gerlach.*)

Per Cent.	Potassium Bromide.	Lithium Bromide.	Sodium Bromide.	Barium Bromide.	Calcium Bromide.	Strontium Bromide.	Magnesium Bromide.
5	1.037	1.035	1.040	1.045	1.044	1.046	1.043
10	1.075	1.072	1.080	1.092	1.089	1.094	1.087
15	1.116	1.113	1.125	1.144	1.139	1.146	1.137
20	1.159	1.156	1.174	1.201	1.194	1.204	1.191
25	1.207	1.204	1.226	1.262	1.252	1.266	1.247
30	1.256	1.254	1.281	1.329	1.315	1.332	1.310
35	1.309	1.309	1.344	1.405	1.385	1.410	1.377
40	1.366	1.368	1.410	1.485	1.461	1.492	1.451
45	1.430	1.432	1.483	1.580	1.549	1.590	1.535
50		1.500	1.565	1.685	1.641	1.694	1.625
55		1.580		1.800			

FREEZING MIXTURES.

	Ingredients.	Parts by Weight.	Temperature Produced Starting at 10° C.	Diminution of Temperature.
1	Water	1	−16° C.	26° C.
	Nitrate of ammonia	1		
2	Water	16	−12°	22°
	Saltpetre	5		
	Chloride of ammonium (sal ammoniac)	5		
3	Water	1	−19°	29°
	Nitrate of ammonia	1		
	Carbonate of soda	1		
4	Snow	5	--	20°
	Chloride of sodium	2		
5	Snow	1	--	45°
	Crystallized chloride of calcium	2		
6	Crystallized sulphate of soda	8	−20°	30°
	Hydrochloric acid	5		

APR 2 0 1918

WHITE'S
Photographic
Specialties



FOR PERFECTION IN POSING AND LIGHTING IN THE STUDIO.

Strictly of the highest grade of pattern, workmanship, and material.

By a systematic application of the

O. C. WHITE
Patented Ball-and-Socket Joint,

instant adjustment and fixation in any desired position is obtainable.

WHITE'S New Style Posing Chair.—Neat and attractive in appearance. Capable of an endless variety of combinations. Adapted to persons of all sizes from infants to adults.

WHITE'S Improved Posing Supports.—Great range of adjustment. Two styles.

WHITE'S Improved Photographic Chair Head-Rests.—For attachment to chairs or furniture. Will follow the head to all positions, and is instantly secured by a single touch.

WHITE'S Baby Holder.—For posing infants so as to display draperies or in scenic effects without showing any of the supporting means.

WHITE'S Improved Photographic Head Screens and Side Shades.—Three styles. Side shades square, oval, or round. Instant adjustment to any position.

A system of interchangeability is carried throughout the Appliances, permitting quick combinations for every conceivable studio requirement.

AMPLY PROTECTED BY NUMEROUS PATENTS.

AWARDED

GOLD MEDAL, Massachusetts Charitable Mechanic Association, Boston, 1884.
SILVER MEDAL, Photographers' Association of America, 1888.
JOHN SCOTT MEDAL AND PREMIUM, Franklin Institute, Philadelphia, Pa.
MEDAL AND DIPLOMA, Wiesbaden, Germany, 1891.
HONORABLE DISTINCTION, Geneva, Switzerland, 1892.
THREE MEDALS AND AWARDS, World's Fair, Chicago, 1893.
SILVER MEDAL, Massachusetts Charitable Mechanic Association, Boston, 1895.

Send for catalogue. For sale by all leading dealers.

OTIS C. WHITE,
WORCESTER, MASS., U. S. A.

—THE—

"NEW AMERICAN"

ROLLABLE FILM.

This film is manufactured by an improved patented process of which we are the sole owners for the United States. The factory has been erected especially for the purpose, and is located under exceptionally favorable conditions; it is equipped with the latest and most perfectly made machinery. No expense has been spared to insure the production of a superior article, which will be uniform, reliable, and easily manipulated.

It has no JOINS OR SEAMS, in rolls of any length. The Standard rolls are wound in such a manner as to admit of their being used in both makes of roll-holders.

The DAYLIGHT LOADING ROLLS are adapted for use, not only in the Buckeye Cameras, but the other daylight-loading cameras copied after the same principle.

PRICE-LIST.

STANDARD ROLLS.

WIDTH	LENGTH	EQUAL TO FOLLOWING EXPOSURES	PRICE
3¼ ins.	108 ins.	25 3¼ × 4¼	$1.00
3¼ "	215 "	50 3¼ × 4¼	2.00
3½ "	90 "	25 3½ × 3½	1.00
3½ "	180 "	50 3½ × 3½	2.00
4 "	130 "	25 4 × 5	1.50
4 "	255 "	50 4 × 5	3.00
4¼ "	135 "	40 4¼ × 3¼ or 25 4 × 5 22 4¼ × 5½ or 20 4¼ × 6½	2.00
4¼ "	265 "	80 4¼ × 3¼ or 50 4 × 5 48 4¼ × 5½ or 40 4¼ × 6½	4.00
4¾ "	170 "	25 4¾ × 6½	2.50
4¾ "	335 "	50 4¾ × 6½	5.00
5 "	180 "	44 5 × 4 or 25 5 × 7 or 22 5 × 8	3.00
5 "	355 "	88 5 × 4 or 50 5 × 7 or 44 5 × 8	6.00
5¼ "	105 "	25 5¼ × 4	2.00
5¼ "	180 "	25 5¼ × 7 or 43 5¼ × 4	3.00
5¼ "	205 "	50 5¼ × 4	4.00
6½ "	218 "	25 6½ × 8½	4.00
6½ "	435 "	50 6½ × 8½	8.00
7 "	128 "	25 7 × 5	3.25
7 "	255 "	50 7 × 5	6.50
8 "	255 "	25 8 × 10	6.00
8 "	505 "	50 8 × 10	12.00

DAYLIGHT-LOADING ROLLS. 12 Exposures, 3½ x 3½, 60 cts.
12 " 4 x 5, 90 cts.

Special quotations given on application for special widths and lengths. Order of your dealer, but if he cannot promptly supply you, send direct to the FILM WORKS of

THE AMERICAN CAMERA MFG. CO., Northborough, Mass., or

E. & H. T. ANTHONY & CO., Trade Agents,

591 Broadway, NEW YORK. 45-47-49 East Randolph St., CHICAGO.

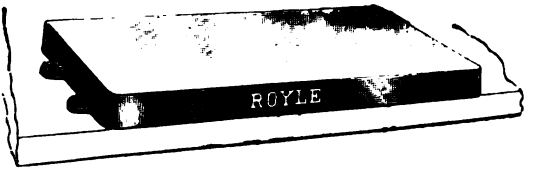


Photo-Engravers

CANNOT EXPECT TO CARRY ON BUSINESS SUCCESSFULLY UNLESS THEY HAVE PROPER EQUIPMENT. LACK OF SUITABLE TOOLS HAS BEEN THE OCCASION OF MANY BUSINESS REVERSES. WE ARE SPECIALISTS IN MACHINERY FOR PHOTO-ENGRAVERS. WE BUILD A COMPLETE LINE OF TOOLS FOR IMPROVING AND CHEAPENING THE WORK OF MOUNTING PLATES.

John Royle & Sons,

Paterson, N. J., U. S. A.

LANTERN SLIDES

HOW TO MAKE AND COLOR THEM.

(ILLUSTRATED.)

By DWIGHT LATHROP ELMENDORF.

A thoroughly practical treatise on Lantern-Slide-Making, lucidly describing every step, from the selection of the negative to mounting the slide. The chapter on coloring Lantern Slides is the only practical matter published on this subject.

CONTENTS.

Introduction.
Chemicals and Apparatus Required.
The Contact Method.
The Camera Method.
Diseases and Remedies.
Testing Slides.
Coloring Slides.

Printed on heavy wood-cut paper and handsomely bound in cloth. Illustrated with wood-cut and half-tone engravings.

PRICE, $1.00.

E. & H. T. Anthony & Co.

591 Broadway, NEW YORK.
45-47-49 East Randolph St., CHICACO.

CARBON TISSUE

Made by the Autotype Co., London, England.

USED IN MAKING CARBON PRINTS, TRANSPARENCIES, ETC., GIVING PERMANENT PICTURES.

NO.	COLORS.	SIZE OF BAND.	PRICE PER BAND.
100.	Standard Brown,	2½ x 12 ft.	Sold in Bands only.
103.	Warm Black,	"	
104.	Engraving Black,	"	
105.	Sepia,	"	
106.	Red Chalk,	"	$2.75
113.	Portrait Brown,	"	
115.	Lambertype Purple (for Portraits),	"	
151.	Sea Green,	"	
152.	Dark Blue,	"	
	Warm Sepia,	"	
107.	Special Transparency Black,	2 x 12 ft.	3.60
108.	Single Transfer, Med. Thick,	2½ x 12 ft.	1.20
79.	" " Fine, Thin,	"	1.50

DOUBLE TRANSFER FINAL SUPPORT.

86.	Medium Thickness,	2½ x 12 ft.	1.30
87.	Fine, Thin for small Work,	"	1.50
	Sawyer's Tempory Support, sheets 18 x 23 in., per sheet,		.35
	" " " " " dozen "		3.80
	" " " " 36 x 48 in., "		1.30
	Waxing Compound, per cake,		.25
	Johnson's Actinometer with Sensitive Paper,		1.10
	Sawyer's " " " "		2.20
	Burton's " " " "		2.75

THE TEMPORARY SUPPORT upon which are treated pigment prints from ordinary negatives, permits of the prints being developed upon it with the same ease and facility as did the Single Transfer, of which this takes the place. This support can be used an indefinite number of times, only requiring to be rubbed over with the Waxing Solution to insure the stripping of the print from its surface.

THE FINAL SUPPORT is a special paper coated with a gelatinous emulsion of a permanent white or tinted pigment. It supersedes the old Double Transfer Paper by reason of its greater efficiency and the ease and simplicity of working with it. It will keep good for an indefinite time, does not require hot water, and forms a permanent basis for the pigment print.

ETCHING PAPER.—Single Transfer. A rough-surfaced toned Etching Paper for Single Transfer, yielding prints with broad artistic effect, and free from the glaze of an ordinary carbon print. By masking the negative, prints may be developed on this paper with suitable margin, rendering mounting unnecessary.

Band 2½ x 12 feet, - - - $1.60

CELLULOID IN SHEETS, (White), 20 x 50 inches, $\frac{18}{1000}$ in. thick, per sheet.....$1.25
" " " " 20 x 50 " $\frac{22}{1000}$ in. " " " 2.00
Sold only in full sheets.

CUT SIZES.

TISSUE.		TRANSFER PAPER.	
Sea Green, Warm Black and Sepia.		No. 86 Dble. Transfer.	No. 108 Single Transfer.
Package of One Dozen.			
4x5.....	per pkge., $0.25	$0.15	$0.10
5x8.....	" .50	.25	.20
6½x8½.....	" .65	.35	.30
8x10.....	" 1.00	.45	.40

Complete Instructions for working the Carbon Process will be found in our Publication No. 33—**"Carbon Printing for Professionals and Amateurs."** Price, 50 cents.

A B C Manual on Carbon Printing, by the Autotype Co., last edition, illustrated, handsomely bound, $1.00.

E. & H. T. ANTHONY & CO.,

591 Broadway, New York City;
45, 47, 49 East Randolph St., Chicago.

Sole Agents for the U. S.

WE MAKE NINETEEN KINDS OF PHOTOGRAPHIC PAPER,

Gelatine, Collodion, Bromide, etc.; but for contact printing we recommend VELOX, which is used daily by thousands all over the world because it is the most satisfactory paper ever produced.

Prints are made in a few seconds without the aid of the sun or ruby light. A customer, commenting on this extremely easy process, sums up as follows:

"Reduces labor 50 per cent., time 80 per cent., expense of material 25 per cent. It gives me much better work to deliver to my customers and secures an absolutely permanent print."



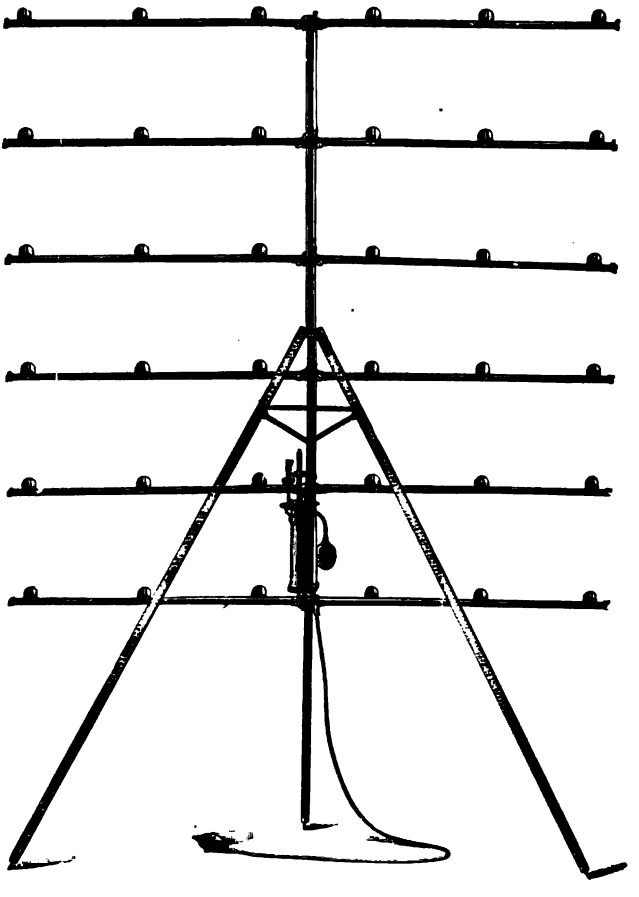
Head Office and Works:
NEPERA PARK, N. Y.

Branch Offices: { Paris, France, 159 Faub. poissonière.
{ Chicago, Ill., 35 & 37 E. Randolph St.

THE IMPROVED **WILLIAMS . . .**

Flash-Light Apparatus.

48 CUPS. COMPACT. PORTABLE.



MAY BE USED WITH GAS OR GASOLINE.

Price, complete, $50.00.

E. & H. T. ANTHONY & CO.,

591 Broadway, New York. 45-47-49 East Randolph St., Chicago.

THE TURNER-REICH

Anastigmat Lens

Is unsurpassed by any in the market.

It has an aperture of F : 7.5.

MARVELLOUS DEPTH OF FOCUS AND AN ABSOLUTELY FLAT FIELD.

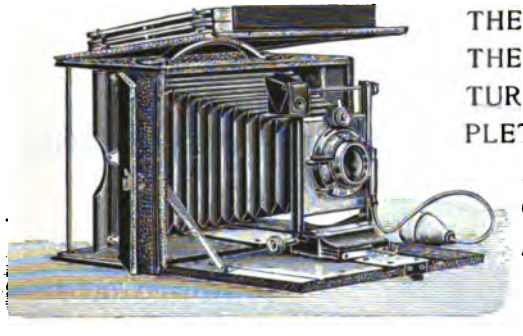
PRICES LOWER THAN THOSE OF ANY OTHER ANASTIGMAT LENS.



Our Lenses are World Renowned.

OUR SHUTTERS LEAD.

Our Korona Cameras are unsurpassed in Workmanship or Finish.



THE ONLY CONCERN IN THE UNITED STATES TURNING OUT A COMPLETE CAMERA, LENS, AND SHUTTER, ALL OF THEIR OWN MANUFACTURE.

◆◆◆◆

GUNDLACH OPTICAL CO.,

751 to 765 South Clinton St., ROCHESTER, N. Y.

SEND FOR CATALOGUE.



900

Semi-Centennial Stands

in 900

Photographic Studios.

1000

More still contemplating using the only time-saving stand ON THE MARKET.

All Dealers sell them.

Wholesale Dealers in

PROFESSIONAL AND AMATEUR PHOTOGRAPHIC SUPPLIES.

HORGAN, ROBEY & CO.,

34 BROMFIELD ST., BOSTON, MASS.

Professional Paste

The Cleanest, Most Reliable, and Economical.



PRICES.

1 Gallon.....	$1.20
½ Gallon.....	.75
1 Quart	.50
16 Ounces	.40
8 Ounces.....	.25
4 Ounces.....	.15

All Dealers.

E. & H. T. ANTHONY & CO.,

MANUFACTURERS,

591 Broadway, New York.
45-47-49 East Randolph St., Chicago

SEND TO US FOR

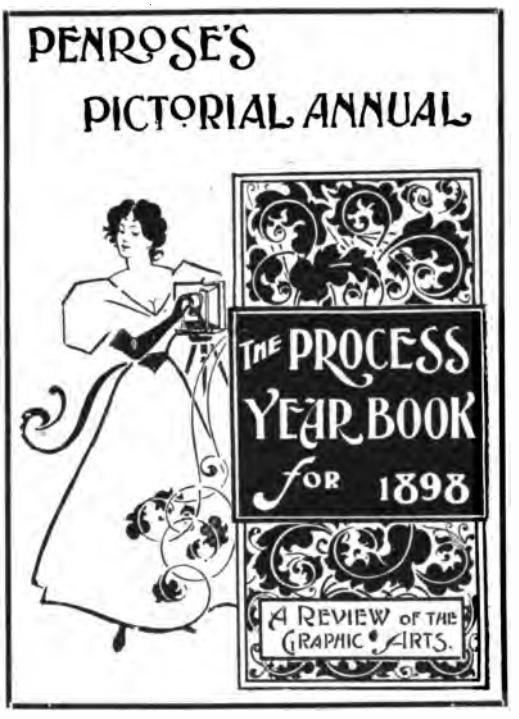
CATALOGUE
OF
SUPPLIES
FOR

Photo-Engraving,

AND ALL

PHOTO-MECHANICAL PROCESSES.

E. & H. T. ANTHONY & CO.,
591 Broadway, N. Y.
45-47-49 East Randolph St., Chicago



Four volumes of this Famous Annual have now been published.

The 1899 Edition will be published early in the year.

Price, in Full Cloth Gilt Binding,

$1.50

A Book full of interest to

Photo-Engravers, Photographiers and Artists.

May be obtained of all Booksellers and Photographic Dealers, or direct from the Publishers,

PENROSE & Co.,
8 and 8a, Upper Baker Street, Lloyd Square, London, W. C.

American Edition published by
G. Gennert,
24 and 26, East Thirteenth Street, New York.

Australian Agent:
Frank Middows,
Safe Deposit Buildings, Sydney.

Praise Everywhere.

"A real acquisition to one's library."
"Quite the book for everyone."
"It is brimming over with illustrations of every variety."
"It is a sumptuous pictorial annual."
"Contains samples of everything good in process work."
"Ahead of the previous issues of this beautiful publication."
"Of great interest from an art point of view."
"There is certainly no falling off in this year's edition."
"Offers a wealth of illustration."
"The book deserves a large measure of praise."
"Will interest and please a picture-loving public."
"A triumph of artistic printing in its highest form."
"The fare is varied, not too technical, and even with a spice of humour."

Metacarbol — The Most Powerful Developer Known.

Chavant

"Having used Metacarbol for a developing agent since its first introduction, with wonderful success, I can most heartily recommend it for its many qualities which are an advantage over all other agents for developing now in use. In the first place it is very uniform; no danger of fog; works equally as well for under- or over-timed plate; gives you the finest colored negative possible, which produces a beautiful rich print with all details fully preserved. Being a one-solution developer makes it convenient to work; always ready for action; does not injure your hands or system, nor leave your hands in an unpresentable condition.

"My method of using is to mix a quantity sufficient for development, say, of twenty-four cabinet negatives. When through, put in bottle and cork tight. For next development, add a small portion of stock solution; continue with same result as at first. This will last by this method for some time, making it an inexpensive agent. The result of last will be equally as good as first.

"My method of mixing is to take half an ounce of Metacarbol, 1 ounce of caustic soda, 2 ounces of sulphite, and 50 ounces of water. Be sure to dissolve the Metacarbol and caustic soda in a little hot water for a couple of hours, or longer if convenient; then add sulphite and water. For use I take 1 ounce of solution to 2½ ounces of water, which will produce beautiful results.

"I have never had any trouble with under- or over-timed negatives. You will when you come to print find the beautiful effect, and all worry and trouble of over- or under-timed negatives, which so much destroys the pleasure of the photograph business, will cease."

J. M. VAN NORMAN, Buffalo, N. Y.

"I received the sample of Metacarbol and have given it a trial. I like the results obtained with it very much. Will you quote price on it, and if in my reach will use it."

A. L. BOWERSOX, Dayton, O.

"Some weeks ago you sent us a sample of Metacarbol developer. We used it in developing a group that we are almost certain would not come with any other developer that we have ever tried. The white drapery was as fine as we have ever seen. It makes a smooth, brilliant negative."

KNAFFL & BRO., Knoxville, Tenn.

"Sample of the new developer 'Metacarbol' you kindly sent to me is the best thing in the way of a developer I ever used. I made three negatives on 5 x 7 plates, Bausch & Lomb shutter one-hundredth second, and obtained full-timed negatives. It works well for portraits, making good, crisp negatives, of good and quick-printing qualities. You deserve the thanks of the fraternity for introducing the ideal developer, and I think you will have large sales of it. Kindly give me the price by the pound."

W. H. DUNWICK, Pulaski, N. Y.

"The test of Metacarbol developer was most successful. I found it equal to the best I ever used. Besides it does not stain the fingers."

GEO. W. KETCHAM, 25 Cliff St., New York.

"The Metacarbol worked very finely, equal in every way, if not superior, to the developing agents now on the market."

GEORGE STECKEL, Los Angeles, Cal.

"I have personally given it (Metacarbol) a very fair test, and find that it is a splendid developing agent."

J. ED. RÖSCH, St. Louis, Mo.

"The new developer, Metacarbol, pleased me very much. It is exceedingly rapid, and gives fine detail, clear shadows, and splendid printing quality. Please send me 3 ounces."

F. M. SOMERS.

"We were much pleased with Metacarbol, and find that by its use a much shorter exposure can be made than on a plate of same emulsion that has been developed in the usual way. Add me to your staff of consumers of Metacarbol."

C. M. HAYES & CO., Detroit, Mich.

"Your Metacarbol is among the first of the new developers."

URLIN & BECKER, Cleveland, O.

Price :

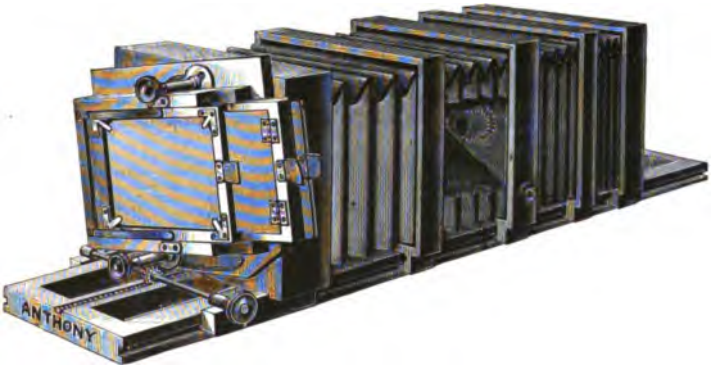
1-oz. bottle,	$0.75	8-oz. bottle,	$5.25
2-oz. "	1.50	16-oz. "	10.00
4-oz "	2.75		

For Sale by all Dealers.



Anthony's Lantern Slide Camera

For Copying Negatives for Use in the Lantern.



Is made with special reference to transparency work, and has an oscillating frame carriage for ground-glass and plate-holder, to facilitate the adjustment of the picture on the plate.

Price - - - - - - - - - - $12.00

FOR SALE BY ALL DEALERS

Portable Photograph Galleries,



WITH LEONARD'S PATENT CONCEALED

TUBULAR IRON FRAMES.

Made of Pine siding or corrugated iron set in strong frames. Inside Oil finished, outside painted. Sky-lights and dark room as wanted. Warranted storm-proof and easily set up.

Cheap, handsome, strong and durable.

SEND FOR CATALOGUE.

IRON COTTAGE CO., Grand Rapids, Mich.

RULED ◆ CROSS-LINED ◆ SCREENS

FOR HALF-TONE WORK.

Examine under microscope and note perfect sharpness of edge, perfect opacity of lines, and perfect transparency of spaces.

All sizes and rulings furnished at shortest notice. Write us if you are in the market for the best ruled screen.

All plates are made square unless otherwise ordered.

PRICE LIST.

Sizes in Inches.	Lines per Inch.						
	75, 80 or 85.	100.	110 or 120.	125 or 133.	140 or 145.	166 or 172.	200.
6 x 8	$15 00	$18 00	$20 00	$22 00	$26 00	$32 00	$40 00
6½ x 8½	18 00	20 00	24 00	28 00	32 00	40 00	50 00
7 x 9	24 00	25 00	30 00	36 00	42 00	50 00	65 00
8 x 10	32 00	35 00	42 00	48 00	54 00	68 00	82 00
9 x 11	35 00	40 00	55 00	60 00	70 00	85 00	100 00
10 x 12	40 00	52 00	72 00	80 00	95 00	110 00	130 00
11 x 14	60 00	80 00	100 00	115 00	135 00	150 00	180 00
12 x 15	80 00	105 00	135 00	148 00	180 00	200 00	235 00
13 x 16	100 00	130 00	166 00	188 00	210 00	245 00	300 00
14 x 17	125 00	165 00	200 00	230 00	275 00	300 00	375 00
15 x 18	160 00	200 00	240 00	275 00	330 00	375 00	
16 x 20	190 00	240 00	280 00	330 00	375 00		
17 x 21	230 00	285 00	330 00	375 00			
18 x 22	275 00	325 00	385 00				

TRIAL SIZES.

Sizes.	All Rulings up to—			
	133.	140 or 150.	166 or 175.	200.
3¼ x 4¼	$2 00	$3 00	$5 00	$8 00
4 x 5	4 00	6 00	8 00	12 00
4¼ x 6½	6 00	8 00	10 00	16 00
5 x 7	12 00	14 00	18 00	22 00
5 x 8	14 00	17 00	22 00	32 00

For single-ruled screens, 33⅓ per cent. less.
For split-line screens, 50 per cent. more.
Special quotations on larger sizes and different rulings.
Experimental plates made to order.

E. & H. T. ANTHONY & CO.,

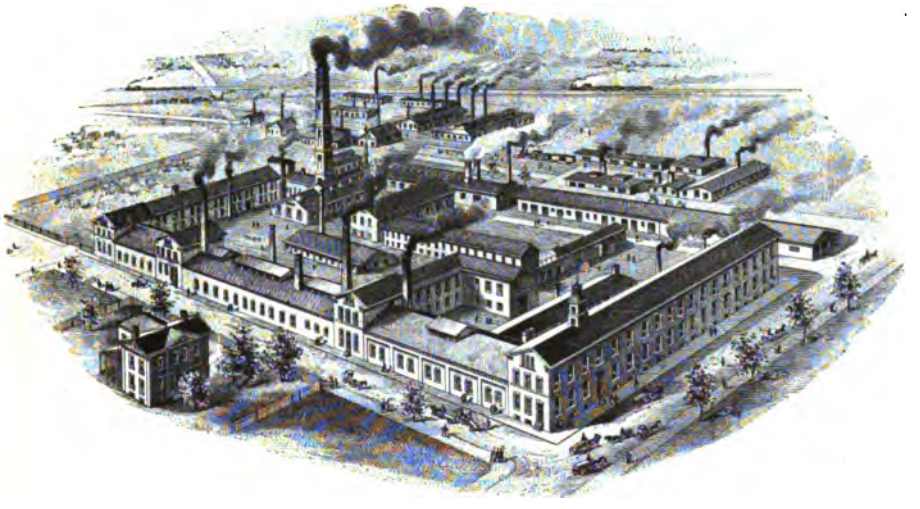
591 Broadway, NEW YORK. **45-47-49 East Randolph St., CHICAGO.**

CHAS. COOPER & CO.

(Established 1857.)

MANUFACTURING CHEMISTS

194 Worth Street, New York.



WORKS AT NEWARK, NEW JERSEY.

WE MANUFACTURE:

Com'l. and Chem. Pure Acids, Sulphite Soda, Crystals and Granular,
Acid Sulphite Soda Solution, Nitrate Silver, Chemically Pure,
Chloride Gold, Litmus Paper, Conc. Sulphuric Ether.
Anhydrous and Aqua Ammonia.

Bromo-Oxygen Disinfectant, U. S. Patent, a most efficient disinfectant and deodorizer; can be diluted with 32 parts of water. And a full line of Chemicals, Photographic, Medicinal, and for the Arts and Technical purposes.

SOLUBLE COTTON, AMYL ACETATE, AND EXTRA REFINED WOOD ALCOHOL.

Monthly Price-List Issued.

Refiners of Photo Waste.

Manufacturers of the Columbian System of Chemical Fire Extinguishers and Chemicals for same.

Albumen Paper.

N. P. A.

WHITE, PINK, PEARL, PENSÉ,

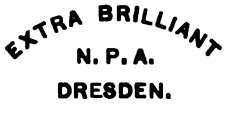
WITHOUT EXCEPTION

THE BEST IN THE MARKET.

All Paper Used for this Brand is Made EXCLUSIVELY FOR US, and is Readily Distinguished by the

WATER MARK N. P. A.

Look out for the Registered Trade-Mark:



Though UNEXCELLED IN QUALITY, its Price is no Higher than any other First-Class Albumen Paper.

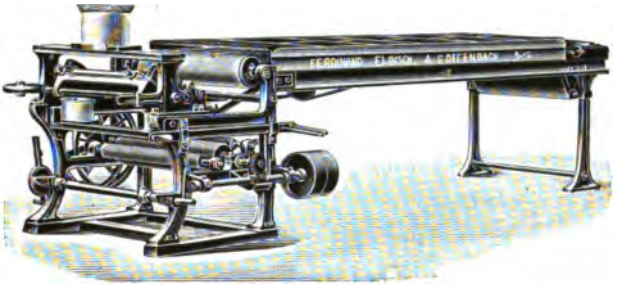
PRICES SENT ON APPLICATION.

SOLE IMPORTERS:

E. & H. T. ANTHONY & CO.,

NEW YORK AND CHICAGO.

CELLOIDINPAPER, GELATINEPAPER AND BARIUM PAPER COATING MACHINES FOR PHOTOGRAPHIC USES, OF THE LATEST, BEST, AND MOST IMPROVED CONSTRUCTION FURNISHED BY FERDINAND FLINSCH MACHINERY-MAKING AND IRON-FOUNDING COMPANY, LTD., AT OFFENBACH-ON-MAIN GERMANY.



MACHINERY FOR MAKING CHROMO-ENAMEL AND SURFACE COLORED PAPERS, COATED BOOK OR ART PAPERS, PHOTO TYPE PAPERS, TRACING AND CARBON PAPERS, ETC.

MANY PLANTS DELIVERED TO EVERY PART OF THE WORLD.

SUFFOLK
ENGRAVING·COMPANY
* * *
275·WASHINGTON·ST
BOSTON
HALF-TONE * ZINC ETCHING
WAX AND WOOD·ENGRAVING
COLORTYPE
TELEPHONE 3686

HALF-TONE
GATCHEL AND MANNING
PENNA ELECTRO PHOTO-TYPE
ENGRAVING
COMPANY
OFFICES 33 S. 6TH ST.
PHILADA
FACTORY 27 TO 41 S. 6TH ST.
DESIGNING WOOD LINE·PHOTO

The Levy Screen



Remains the standard of perfection, and minor improvements are constantly made in the manufacture.
The maker aims at the highest possible standard in this, the most perfect appliance of the

Half-Tone Process.

These screens can always be repaired and renovated, and the surfaces re-polished at nominal cost, and when so repaired are again as good as new.



NEW PRICE LIST AUGUST, 1898.

MAX LEVY,

1213 Race St., Philadelphia, Pa., U. S. A.

FOREIGN SELLING AGENTS:

ENGLAND: Penrose & Co., 8 Upper Baker St., London, W. C.
FRANCE: J. Voivin, 15 Rue Mayet, Paris.
GERMANY AND AUSTRIA: F. Hemsath, Röderbergweg 135, Frankfort-a/M.
AUSTRALIA, Melbourne: M. D. Gershel.
NEW SOUTH WALES, Sydney: Harrington & Co.
JAPAN: R. Konishi, Tokio.

New York Studio Outfit

THE BEST ON THE MARKET

8 x 10 Mahogany Portrait Camera, One Benster Holder.

Anthony's Automatic Cabinet Attachment, One Curtain Slide Holder.

No. 1 New York Camera Stand.

Holder Rack, made to Carry Twelve Holders.



8 x 10 Outfit, - - - $45.00 | 11 x 14 Outfit, - - - $70.00

ALL HOLDERS NOW FITTED WITH CURTAIN SLIDES.

MANUFACTURED BY

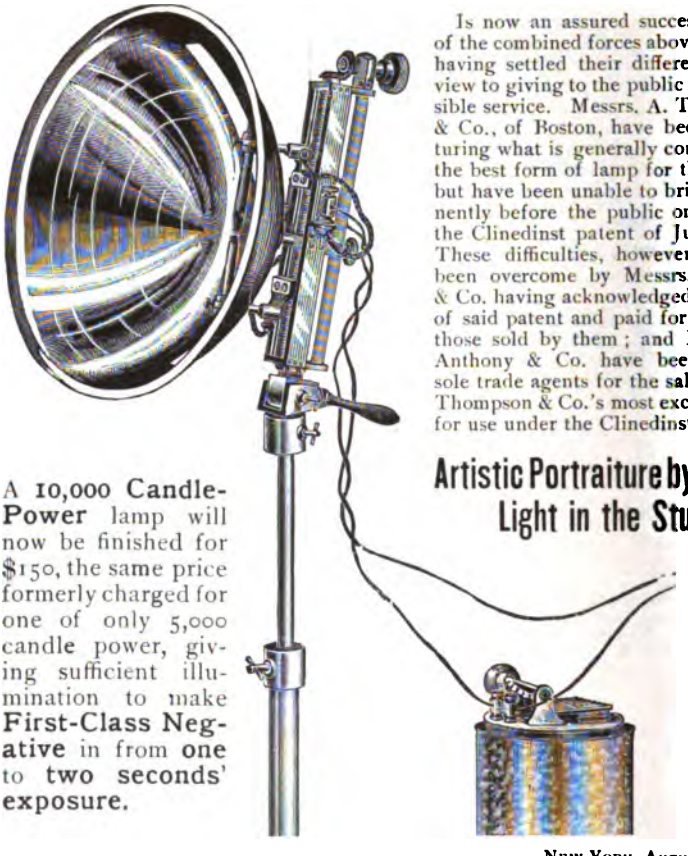
E. & H. T. ANTHONY & CO., 591 Broadway, NEW YORK.
45-47-49 East Randolph St., CHICAGO, ILL.

ELECTRIC PHOTOGRAPHY

. . . . BY THE

A (ANTHONY) C (CLINEDINST) T (THOMPSON) SYSTEM

Patented July 24th, 1894.



Is now an assured success by reason of the combined forces above-mentioned having settled their differences with a view to giving to the public the best possible service. Messrs. A. T. Thompson & Co., of Boston, have been manufacturing what is generally conceded to be the best form of lamp for this purpose, but have been unable to bring it prominently before the public on account of the Clinedinst patent of July 24, 1894. These difficulties, however, have now been overcome by Messrs. Thompson & Co. having acknowledged the validity of said patent and paid for licences for those sold by them; and E. & H. T. Anthony & Co. have been appointed sole trade agents for the sale of Messrs. Thompson & Co.'s most excellent lamps for use under the Clinedinst patent for

Artistic Portraiture by Artificial Light in the Studio.

A **10,000 Candle-Power** lamp will now be finished for $150, the same price formerly charged for one of only 5,000 candle power, giving sufficient illumination to make **First-Class Negative** in from **one** to **two seconds'** exposure.

Send for Circular

NEW YORK, August 21, 1897.

A. T. THOMPSON & CO., Boston, Mass.:

GENTLEMEN:—For the past six months I have used your 10,000-candle-power electric lamp exclusively in my ground-floor studio, and I unquestionably pronounce it the "Light of Lights."

During the above-mentioned time I have made thousands of sittings, and the lamp has never failed to give perfect satisfaction.

Before purchasing your lamp, other electric lamps were sent to me for trial, but I was unable to make fully-lighted negatives.

I am free to admit that I was somewhat skeptical in regard to the practical value of any form of artificial light in a ground-floor studio, but I have demonstrated to my satisfaction that your lamp is all you claim, and I am perfectly willing to demonstrate this fact to other photographers who may call on me at any time.

Wishing you the success you deserve, I am yours very truly, (Signed), J. DE YOUNG.

E. & H. T. ANTHONY & CO., Sole Trade Agents, 591 Broadway, N. Y. 45-47-49 East Randolph St., Chicago.

PLATINOTYPE HAS THREE DISTINCT CHARMS:

1st, **PERMANENCE.**
2d, **SIMPLICITY.**
3d, **ART.**

But only on W. & C. Papers.

SEND FOR ILLUSTRATED PAMPHLET TO

WILLIS & CLEMENTS,

1624 CHESTNUT STREET, PHILADELPHIA, PA.

THE ACME
Transparent Water Colors



Especially adapted for

Photo-Portrait Coloring

And Decorating of all kinds of

Paper and Cloth Fabrics

Are Unrivalled Fast Colors

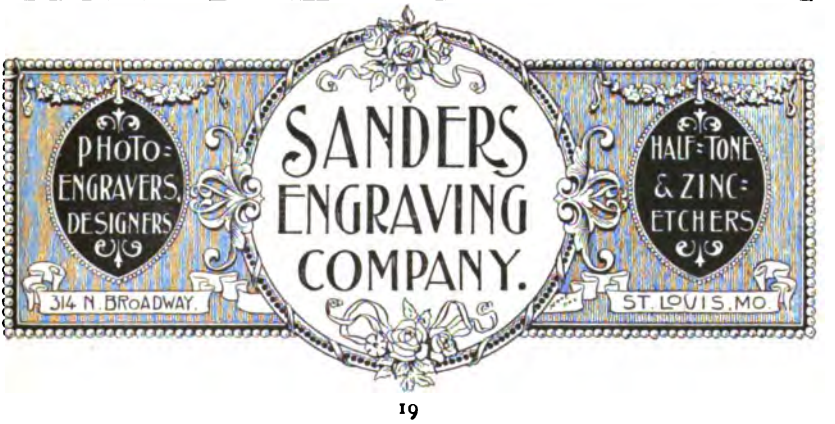
PRICES:

16 Colors in large box · $2.50
Amateur box, 6 colors · 1.00
Acme Medium · · · .35

Full instructions in every box. Send for Descriptive Circular.

ACME WATER COLOR CO., Mrs. T. M. Starr, Mgr.

3448 INDIANA AVE., CHICAGO, ILL.



The Autotype Company

LONDON

ESTABLISHED TWENTY-SIX YEARS. AWARDED TWENTY-FOUR PRIZE MEDALS.

Depots in Paris, Berlin, Vienna, Brussels, St. Petersburg, Milan, Amsterdam, Copenhagen, New York, Sydney, N. S. W.

Autotype Tissues, Transfer Papers

And materials for Permanent Pigment Printing, are adopted throughout the civilized world.

100 Standard Brown	106 Red Chalk
101 Standard Purple	95 Chocolate Red
103 Warm Black	96 Chocolate Brown
104 Engraving Black	150 Ruby Brown
105 Sepia	152 Dark Blue
111 Cool Sepia	151 Sea Green
97 Warm Sepia	113 Rich Warm Brown

114 Rich Purple Tone

107 Tissues for Transparencies

Special Tissues for Photogravure

The large increase in the Company's manufacturing installation ensures the prompt execution of all orders.

The wide experience of the Company in the Choice of Permanent Pigments, *the skilled labour and perfect machinery employed in manufacture, has secured for their materials the confidence and approbation of the principal Photographers of the World.*

SOLE AGENTS FOR THE U. S. A.

E. & H. T. ANTHONY & CO.,

591 Broadway, New York. **45-47-49 E. Randolph St., Chicago.**

WYNNE'S
Infallible Exposure Meter



Is the simplest and most compact device for the correct timing of exposures ever produced. By its use, the most difficult subjects, with the widest possible differences in lighting, may be perfectly timed.

It is in great demand, and

A GOOD SELLER.

PRICE, in Handsome Solid Nickel Case,

$2.75.

Extra Tins Sensitized Paper, 25 Cents.
Extra Dials and Glasses, 25 Cents.

WYNNE'S
Infallible Print Meter.



A perfect means of correctly timing Carbon, Platinotype, or other prints, and for testing the speed of plates and paper.

PRICE, in Handsome Electro Cases, $2.75.

Extra Packets of Exposure Strips, 25 Cents.

E. & H. T. ANTHONY & CO., Sole Agents,

45-47-49 E. Randolph St., Chicago. 591 Broadway, New York.

RIVES PAPERS.

ESTABLISHED 1783.



B. F. K. RIVES.

PLAIN BASIC PAPERS

For all Photographic Processes.



Blanchet Frères & Kléber,

RIVES—ISÈRE, FRANCE.

621 Broadway, NEW YORK.

KING Belt Background



Patented Oct. 28, 1890. Patent Number 439,512.

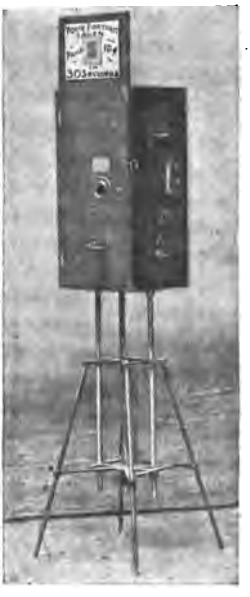
Background painted on Burlap, in dark effects, for Aristo-Platino. Continuous belt, 5 feet wide, 16 feet long.

Quick Changes, Endless Variety, Artistic Effects.

PRICE, Background and Carrier, Complete, **$35.00.** By all Dealers.

E. & H. T. ANTHONY & CO. TRADE AGENTS. **NEW YORK & CHICAGO.**

PORTABLE
PHOTOGRAPH
.... MACHINES



SOMETHING NEW.

UP TO DATE.

Price only $75.00

Size of Plate, 2 1-4 x 1 7-8 inches. Time of Exposure, 6 seconds. Delivered in 30 seconds. True to Life, at the small cost of 5c. each to the public.

Can be operated Winter and Summer, also at Night by having Arc Lamp

Total Weight, 50 lbs.

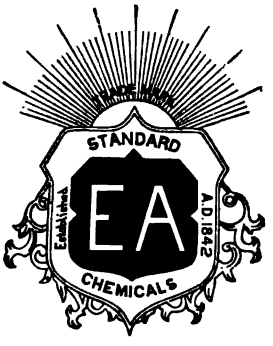
For $107.65

You get Machine, 1,020 Plates, 864 Mounts, Chemicals, also includes crating of Machine. The 1,020 Plates and 864 Mounts, at 5c. each will bring you a revenue of $94.20. The public pays us 5c. each, and they will pay YOU. Good results can be obtained. $75 to $100 for 6 days and evenings NOT unusual. One Machine last week took in $273.55, making an average of over $45 per day. Good, fair, but can be duplicated.

National Photograph Machine Co.,

85 Beaver Street, New York.

"IT IS THE BEST I HAVE EVER TRIED." J. C. Whitney.



EXTRA RESUBLIMED PYRO.

"IT IS SUPERIOR TO ANY WE HAVE EVER USED."
J. Will Kelmer.

"I AM NOW USING IT IN THE PLACE OF ANOTHER BRAND THAT I HAVE USED HERETOFORE." Arthur J. Hargrave.

"IT IS THE BEST GOODS I EVER USED." Percy King.

Send for Circular containing Testimonials.

PRICES.

Per ounce Can	$.25
Per 4-ounce Can	.90
Per 8-ounce Can	1.70
Per pound Can	3.25
Per 5-pound Can	15.00

MARCEAU & POWERS write: "Your E. A. Extra Resublimed Pyro is far superior to any we have ever used. We have a 5-pound box more than half gone, and we are sure our negatives are a better quality than heretofore. It is the PYRO we want every time."

E. & H. T. ANTHONY & CO.,
NEW YORK AND CHICAGO.

THE LARGEST INDIA
INDIAN HOUSE FOR

Photographic Apparatus

AND MATERIALS OF EVERY
DESCRIPTION

Artists' Colors and other Requisites

BABAJEE
SAKHARAM & CO.
BOMBAY, INDIA.

Esuf Buildings, opposite Goculdas Tejpal Hospital.

NEW YORK ✱

✱ DRY PLATES

ARE UNEXCELLED IN

RAPIDITY

CLEANLINESS

BRILLIANCY

• • • AND • • •

All Points that go for Excellence in Dry Plates

BE SURE TO GET THE BEST BY ORDERING

NEW YORK PLATES

FROM YOUR

PHOTO-STOCK DEALER

For any information, write to NEW YORK DRY PLATE CO., GUTTENBERG, N. J., U. S. A.

27

USE ONLY THE BEST

PRINTERS WILL FIND THAT

ANTHONY'S PRINTING FRAMES

COMBINE STRENGTH AND UTILITY

: : : NOTICE : : :

First—Strength.
Second—Tongued Joint in back.
Third—Spring Tally.
Fourth—Celluloid Tablet.



Mark the number of the Negative and the quantity of Prints desired on the Celluloid Tablet; register each print made by means of the Tally.

ERROR THEN IS IMPOSSIBLE

PRICES.

Size.	Flat.	Deep.	Size.	Flat.	Deep.
3¼ x 4¼	$0 36		11 x 14	$1 80	$2 40
4 x 5	38		14 x 17	2 40	3 00
4¼ x 5½	40		16 x 20	3 00	4 20
4¼ x 6½	42		17 x 20	3 00	4 50
5 x 7	50		18 x 22	4 00	5 00
5 x 8	52		20 x 24	5 00	5 25
6½ x 8½	60	$1 20	24 x 30		8 80
8 x 10	75	1 40	35 x 45		15 00
10 x 12	1 00	1 60	30 x 60		20 00

When the backs open lengthwise, 10 per cent. additional is charged.

Ask for ANTHONY'S Printing Frames

FOR SALE BY ALL DEALERS

Nelson's

Photographic Gelatine

SPECIALLY PREPARED FOR PHOTOGRAPHIC PURPOSES DRY PLATE WORK, ETC.

"No. 1," "No. 2," and "X Opaque."

This Gelatine may be relied upon as being pure, uniform in quality, and free from alum and other deleterious matter.

Geo. Nelson Dale & Co., Ltd.,

14 Dowgate Hill, London.

TO BE HAD OF ALL PHOTOGRAPHIC DEALERS.

Agents for the United States:
Messrs. JAMES T. SMITH & CO., NEW YORK.



BOSTWICK'S

"Perfect"

Flash Cartridges

They Give a Maximum of Light and a Minimum of Smoke---Easily Ignited, and leave No Burning Box or Other Residue---Put up in Neat Metal Case.

Absolutely Safe.

UNEQUALLED FOR FLASHLIGHT WORK.



MADE IN TWO SIZES.

REGULAR, for ordinary home use, small interiors, and every-day portrait work.

PROFESSIONAL FLASH CARTRIDGE, for large interiors, groups, large heads, and all work where much illumination is desired.

TO USE

Take a cartridge from the box, untwist it, and place it on a coal-shovel, cardboard box, or other similar support, a little above and to one side of the camera. Ignite the wrapper with a match, uncap the lens, and, after the flash, re-cap the lens.

THE FLASH IS INSTANTANEOUS.

ADAPTED EQUALLY FOR PROFESSIONAL AND AMATEUR.

PRICE.

No. 1.	**Regular size, per box of six**	**25 cents.**
No. 2.	**Professional size, per box of six**	**40 "**
No. 3.	**Regular size, per box of twelve**	**40 "**
No. 4.	**Professional size, per box of twelve**	**70 "**

FOR SALE EVERYWHERE. CAN BE SENT BY MAIL.

USE THE

Hammer Dry Plates

ABSOLUTELY

UNIFORM AND CLEAN



Hammer Retouching **Varnish**.

IS THE BEST FOR FINE RETOUCHING

Hammer Eikonogen and Metol **Developers**

READY FOR USE, ARE THE FINEST
PREPARED DEVELOPERS ON THE MARKET

INCOMPARABLE

FOR THE STUDIO FOR THE HAND CAMERA

NO FRILLING IN HOT WEATHER

FOR SALE BY ALL DEALERS AT POPULAR PRICES

MANUFACTURED BY THE

HAMMER DRY PLATE CO.,

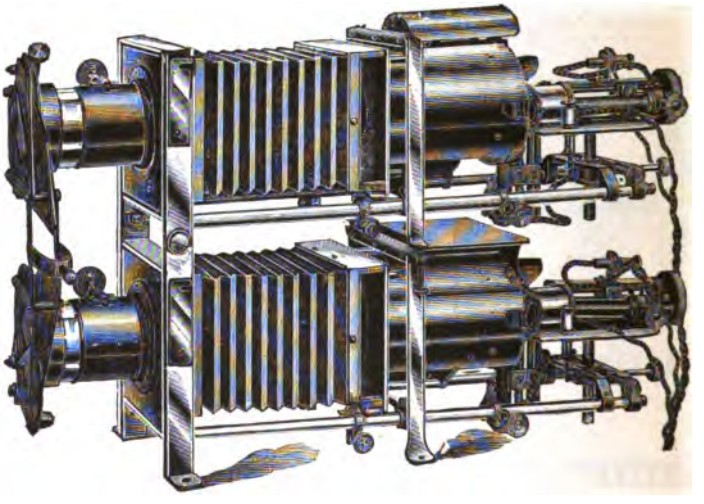
ST. LOUIS, MO.

A. T. THOMPSON & CO'S

IMPROVED ELECTRIC AND LIME LIGHT

STEREOPTICONS,

ARC AND INCANDESCENT ELECTRIC LAMPS.



THE THOMPSON

Improved Dissolving View Electric Light Stereopticon

(Patent Pending.) Style A.

For many years Messrs. THOMPSON & Co. have made a specialty of the manufacture of high-grade stereopticons and all apparatus used in connection with optical projection. These goods are made in their own factory by skilled workmen; hence they are in a position to guarantee their efficiency. These stereopticons are the most compact, portable, and reliable machines on the market, are supplied with every known improvement for the correct and rapid exhibition of lantern slides, and commend themselves to all who desire first-class apparatus at a moderate price. We carry a full line of these goods in stock, which may be seen in operation at any time.

All these Lanterns are made interchangeable for ANY FORM OF LIGHT.

Estimates Furnished on Application. ***Correspondence Solicited.***

SEND FOR ILLUSTRATED CIRCULAR AND PRICE LIST.

E. & H. T. ANTHONY & CO.,

Sole New York Selling Agents, 591 Broadway, NEW YORK.

ESTABLISHED 1880.

GOLD MEDALS AND HIGHEST AWARDS.

London, 1851. Paris, 1867. London, 1862. Philadelphia, 1876. Paris, 1878. Antwerp, 1878. Inventions Exhibition, 1885. Sydney, 1879. Grand Prix and Gold Medal Paris Exposition Universelle, 1889. Kingston, Jamaica, 1891. Chicago, 1893, &c., &c. Grand Prix, Diploma of Honor, & Gold, Silver, & Bronze Medals, Brussels, 1897.



ROSS, LTD.,

Manufacturing Opticians,

Contractors to Her Majesty's Governments, British & Colonial, also to the Principal Governments of Europe and America.

111 New Bond St., London, W.,

ENGLAND.

Principal U. S. Importer,

G. GENNERT, 24 & 26 East 13th Street,

NEW YORK.

ROSS-ZEISS ... PLANAR LENSES.



A New Series of Extra Rapid Lenses.

Working with full aperture from F 3·6 to F 4·5, according to size.

Invaluable for } **Portraits and Groups. Instantaneous Shutter-work. Cinematograph Exhibitions. Copying and Enlarging, etc., etc.**



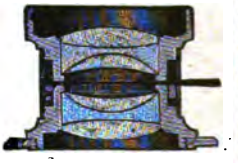
ROSS-ZEISS CONVERTIBLE ANASTIGMATS,

Three Lenses in one.

Consisting of **SINGLE LENSES, f/12·5. DOUBLETS f/6·3. SETS** for every purpose.

These are undoubtedly the finest Single Lenses yet produced, both for rapidity and Flatness of Field, and the Doublets give perfect definition with full aperture.

ROSS-GOERZ DOUBLE ANASTIGMATS.



These deservedly popular Lenses have already had an immense sale. They have been pronounced

"The VERY ACME OF PERFECTION."



ROSS' ROSS-ZEISS ROSS-GOERZ } HAND-CAMERA LENSES.

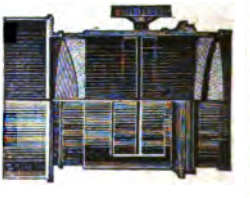
A more extensive and finer selection of **High-Class Lenses** than any other Manufacturer in the World.

You can obtain fine results all the year round in any weather.

FINEST ROSS LENSES,

FOR

THE STUDIO, THE FIELD, PROCESS WORK, TELE-PHOTO WORK, Etc., etc., etc.



ROSS, Ltd.,

The Oldest Photographic Opticians in England,

111 NEW BOND ST., W., LONDON, ENGLAND.

Ross' Cameras ...

FOR

THE FIELD, THE STUDIO,
PROCESS WORK, etc.

Finest Quality and Workmanship.





Superior Hand Cameras.

The Original Twin Lens Cameras.
New Model do. do.

These (Hand or Stand) Cameras have been extensively imitated, but are still unequalled.

They are the smallest, neatest and best.

... THE ROSS ...

Plate or Film Hand Camera

(PATENT).

Takes forty-eight cut Celluloid Films. No Notching of Films. It is unrivalled.





The Photoscope (SANDERS' PATENT).

A Combined Field or Marine Binocular Glass and Camera.

Infinitely superior in general utility and convenience to the so-called photo-binoculars, which are hand cameras only.

Supplied with Daylight loading Cartridges.

ROSS, Ltd.,

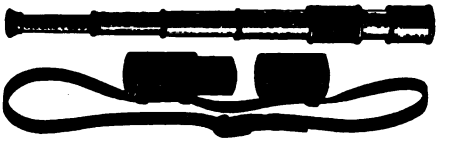
Have received the Highest Awards at all Great Exhibitions.

111 NEW BOND ST., W., LONDON, ENGLAND.









NOTICE.

COMPLETE NEW CATALOGUE

Now Ready. Will be sent to any part of the world on application. Post free.

SECTION I.

Contains full Particulars and Prices of

Ross' Photographic Lenses and Shutters.
Ross' Field, Studio, and Process Cameras.
Ross' New Hand Cameras.
Ross' Photographic Apparatus of every kind.
Ross' Science, Projection, and Enlarging Lanterns, Arc Lamps, etc.

SECTION II.

Contains full Particulars and Prices of

Ross' Microscopes and Objectives.
Ross' Sporting and Naval Telescopes.
Ross' Field, Marine, and Opera Glasses.
Ross' Barometers, Thermometers, &c.
Ross' Spectacles and Eyeglasses, &c., &c.

ROSS, Ltd., Opticians,

111 New Bond Street, London, W.,

ENGLAND.

AND LEADING DEALERS EVERYWHERE.



Buckeye Cameras.

For Daylight Film Cartridges only . .



Regular 3½ x 3½ Buckeye.

Embodying the simplest and best construction, and using the standard Film Cartridges, sizes 3½ x 3½ and 4 x 5, for 12 or 18 exposures, sold everywhere.

The immense advantages of a Camera capable of being *instantly* and *safely* loaded or unloaded in broad daylight, anywhere, cannot be over-estimated, and in practicability and convenience it stands without a peer.

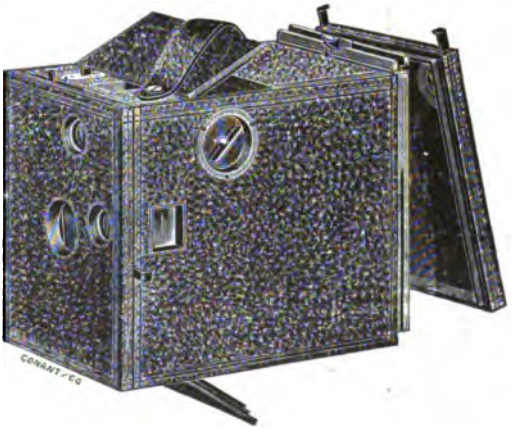
All styles are now fitted with improved shutter and time stop attachment for standard size tripod screw, and other improvements.

The 4 x 5 Buckeye is in its main features like the smaller size, but as a lens capable of making good pictures 4 x 5 can hardly be used as a "fixed focus," a somewhat more elaborate construction is required, though the operation is identical excepting the use of the scale for focusing.

Price of 3½ x 3½, Regular Model, without Cartridge . $8.00
" 4 x 5, " " " " . 12.00

Improved Special Buckeyes.

For Daylight Film Cartridge and . . . Glass Plates



This style of Buckeye has all advantages of the regular model in using the film cartridges and makes an ideal hand-camera for the amateur, as without additional bulk or protruding attachments, the user can change at his will, from Glass Plates to Film, or vice-versa, and is therefore not confined to the use of either.

Price 3½ x 3½, with Plate Holder but without Film Cartridge . $9.00
" " Extra Double Plate Holders " . 1.00
" " Leather Carrying Case with Shoulder Strap . 1.50

Price 4 x 5 with Double Plate Holder but without Film Cartridge, $16.00
" " Extra Double Plate Holder 1.00
" " Carrying Case 2.00

(See pages 2, 50, 51.)

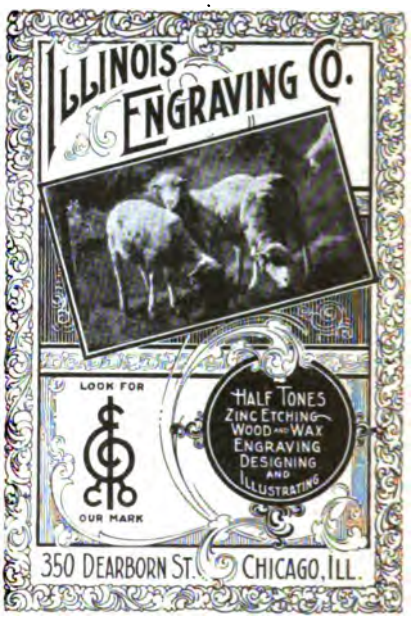
E. & H. T. ANTHONY & CO., New York and Chicago.

This space reserved for

VAN NESS & MOESSNER

Photo-Engravers

78 FIFTH AVENUE NEW YORK



WOODLAND, MO. Works.

NEW YORK, N. Y.
57 East Ninth Street.

ST. LOUIS, MO.
2005 Lucas Place

TRADE MARK
COPYRIGHT SECURED

M.A.SEED
DRY PLATE
COMPANY.
ARROW BRAND

You should use the best plates as they save time and money besides securing the best possible results.

Seed's are the Best.

UNFINISHED!!!

A PRINT, UNLESS IT HAS BEEN THROUGH AN

ENTREKIN Patent Improved Rotary Burnisher.

With Turn Back Roll and Swing Fire-Pan.



May be used with either Gas or Oil.

These Burnishers are especially adapted to burnishing prints made on the . . .

AMERICAN "ARISTO" PAPER.

Your Supply House will send you Descriptive Pamphlet.

The Cheapest and Best Machines now in the Market.

PRICES:

8-Inch Roll, $12.00.	15-Inch Roll, $30.00.
10-Inch Roll, light, $15.00.	20-Inch Roll, $40.00.
10-Inch Roll, heavy, $25.00.	25-Inch Roll, $55.00.

E. & H. T. ANTHONY & CO.,

SOLE AGENTS.

NEW YORK AND CHICAGO.

COLOR
TONE
TEXTURE

and all those qualities most valued by the artistic worker are readily obtained by the use of

Eastman's Royal Bromide Paper.

Enlargements on this paper made through bolting cloth and given the sepia tone have the softness and beauty of rare old etchings. "They are 'pictures,' not 'photographs,'" say the critics.

For sale by all dealers.

EASTMAN KODAK CO.
Rochester, N. Y.

Eastman Kodak Co.

Rochester, N. Y.

MANUFACTURERS OF

Kodaks,
Cartridge Roll Holders,
Eastman's Solio Paper,
Western Collodion Paper,
Eastman's Dry Plates,
Eastman's Royal Bromide Paper,
Eastman's Standard Bromide Paper,
Eastman's Platino Bromide Paper,
Eastman's Enamelled Bromide Paper,
Eastman's Matte-Enamel Bromide Paper,
Eastman's Transparent Film,
Tripods and Other Specialties.

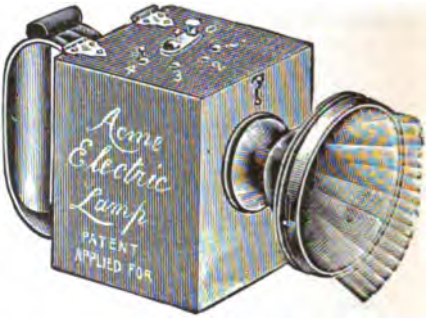
There is no Kodak but the Eastman Kodak.

The quality of our work is displayed facing page 80. If this attracts you, address ❀ ❀ ❀ ❀ ❀ ❀ ❀ ❀ ❀ ❀ ❀
NATIONAL PHOTO-ENGRAVING CO.,
16 and 18 Reade Street, New York.
Telephone 1822 Franklin ❀ ❀ ❀ ❀

Acme Electric Ruby Lamp.

NO HEAT. NO SMELL. NO TROUBLE.

A STEADY LIGHT,
ABSOLUTELY UNDER
CONTROL.
NO LAMP GLASSES TO
BREAK, AND A SOFT,
NON-ACTINIC LIGHT.



The Only Safe Portable Lamp, Price, Complete, - - - $5.00

E. & H. T. ANTHONY & CO., NEW YORK AND CHICAGO.

Weeks' Way Makes it Pay

Original Advertising Ideas.
Catalogs and Booklets written, illustrated, and printed

Weeks Photo-Engraving Co.,
726 Chestnut Street,
Philadelphia, Pa.

Halftone Specialists

Pictures Mounted With HIGGINS' PHOTO MOUNTER



Have an excellence peculiarly their own. The best results are only produced by the best methods and means—the best results in Photograph, Poster and other mounting can only be attained by using the best mounting paste—

HIGGINS' PHOTO MOUNTER
(Excellent novel brush with each jar).

At Dealers in Photo Supplies, Artists' Materials and Stationery.

A 3-oz. jar prepaid by mail for 30 cts. or circulars free, from

CHAS. M. HIGGINS & CO., Mfrs.
168 Eighth Street, Brooklyn, N. Y., U.S.A.

London Office, 106 Charing Cross Road.

The Boston Engraving Co.,

Successors to
The Engraving Department of the Boston Engraving and McIndoe Printing Co.,
The Blanchard and Watts Engraving Co., and
The Photo-Engraving Dept. of C. J. Peters & Son.

ILLUSTRATORS
AND
ENGRAVERS

50 Hartford and 113 Purchase Streets. Boston.

THE BECK ENGRAVING CO

LATE PHILA. PHOTO-ENGRAVING CO
147 NTH. 10TH. ST.,
PHILADELPHIA.



ARTISTIC REPRODUCTIONS
OF EVERY DESCRIPTION

CARBUTT

PLATES

Standard for 20 Years

ALSO

- **ECLIPSE AND ORTHO. 27—Very Rapid**
- **ORTHOCHROMATIC 23—Med. Rapid**
- **ECLIPSE JUNIOR—Rapid, of HIGH quality and LOW in price.**
- **B 16—Slow, allowing great latitude of exposure**
- **NON-HALATION**

Process Plates for Half-tone Engraving

Transparency Plates Plain and Ground Glass

Lantern Plates For Lantern Transparencies

X-RAY PLATES For Radiography

OPAL PLATES Plain or Mat Surface

STRIPPING PLATES for Reversed Negatives

FILMS

In cut sizes as a substitute for Glass, and can be coated with any brand of emulsion.

Especially adapted to Travelling, etc.

In Ribbon form for all makes of **Chrono-photographic Cameras and Projecting Machines.** (Negative and Positive.)

CARBUTT'S DEVELOPERS.

J. C. DEVELOPING TABLETS. A Powerful Developing Agent, allows one half exposure. Put up in three sizes, price, **75** cents, **40** cents, and **25** cents, post free. The large size containing 96 Tablets, enough to develop 8 to 12 dozen 4 x 5 plates or films; the medium size containing 48 Tablets, enough to develop 4 to 6 dozen 4 x 5 plates or films; and small size proportionately. Sample package, 10 cents, post paid.

EQUALLY GOOD FOR *TIME EXPOSURES* AND LANTERN SLIDES.

EIKO GUM HYDRO TWO-SOLUTION DEVELOPER is confidently recommended for use with all brands of Carbutt's Plates and Films. Price, **60** cents.

PYRO and SODA POTASH TWO-SOLUTION DEVELOPER. Price **60** cents.

Carbutt's Dry Plates and Flexible Films are to be obtained from all dealers in photo materials

JOHN CARBUTT

(Pioneer American Manufacturer, *Gelatino-Bromide* and *Orthochromatic Plates and Films.*)

Keystone Dry Plate and Film Works

Wayne Junction, Philadelphia

Cable Address; CARBUTT, PHILADELPHIA

Carbutt Specialties.

Yellow Color Screens, for use with Orthochromatic plates, in photographing Paintings, Landscapes with Clouds, Flowers, etc. Sizes 2½ x 2½, $1.00; 3½ x 3½, each, $1.50.

Color Screens, for Photochromic Process. Sold in sets only. Red, Green, and Violet. Size 2½ x 2½, per set, $3.50; size 3½ x 3½, per set, $5.00. (Other sizes to order.)

"Roxyline" Enamel, for varnishing Lantern Slides, Transparencies, and Negatives. Used cold. 8 oz. bottle, price $ 75

Multum in Parvo Dry Plate Lantern 6 00

Lantern Slide Mats, with gilt line around opening, per 100 . . . 75

Adhesive Binding Strips for Slides, per 100 20

Thin Crystal Cover Glass, 3¼ x 4, per dozen 25

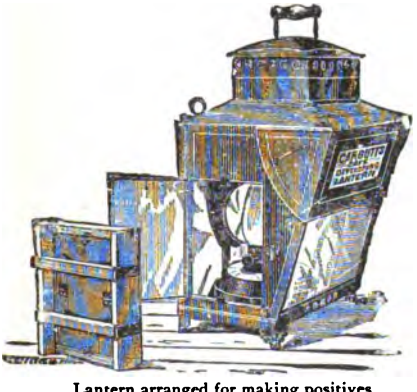
FLUID STRIPPING MEDIUM

For use in stripping negative from Carbutt's Stripping Plates. Pints, 75c. Quarts, $1.35; Gallons, $5.00.

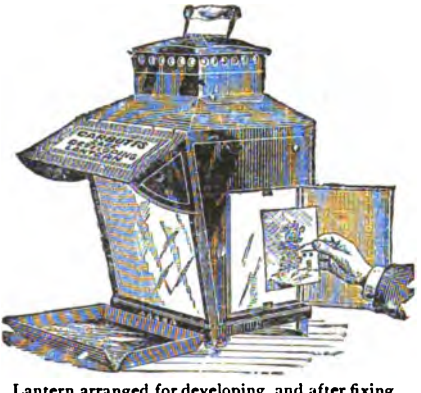
CARBUTT'S Multum-in-Parvo Lantern

furnishes correct light for both Exposure and Development.

Price, $6.00.



Lantern arranged for making positives by contact.



Lantern arranged for developing, and after fixing, examining negatives by opal light.

Carbutt's Dry Plates and Flexible Films and Specialties are to be obtained from all dealers in photo materials. Send to factory for Descriptive Price List.

Manufactured by JOHN CARBUTT

(Pioneer Manufacturer of *Gelatino-Bromide* and *Orthochromatic Plates* in America.)

Keystone Dry Plate and Film Works **Wayne Junction, Philadelphia**

FOR :

PLEASURE

PHOTOGRAPHY.



ADLAKE CAMERA.

$12 and $15.

IT IS THE EASIEST CAMERA. MAKES THE BEST PHOTOGRAPHS. NEVER OUT OF ORDER.

Takes 4 x 5 plates that all dealers keep—no matter what make—get 'em anywhere. The after-expense is least. The pleasure is most.
Sent, express paid, anywhere in the United States.

A CAREFUL BOOK ON IT SENT, IF YOU ASK.

ADAMS & WESTLAKE CO., 110 Ontario St., Chicago.

BAMFORTH'S

Life Model Lantern Slides

ILLUSTRATED SONGS, &c.

The Largest Producer in the World.

Detailed Catalogue, 186 pages, post free, 8d.;
Supplementary List, 1898-9, post free.

Slides made from Customers' Negatives by a Special WET COLLODION PROCESS, giving good results even from poor, weak film Negatives. Send Negative for Sample Slide and Terms Gratis.

JAMES BAMFORTH, Station Road, Holmfirth, Yorkshire.

Standard Photographic Publications

PUBLISHED BY OR OBTAINABLE THROUGH

E. & H. T. ANTHONY & CO.,

591 Broadway, New York. **45-47-49 E. Randolph St., Chicago.**

We carry a full line of the Most Modern Photographic Text-Books. Any book, either Domestic or Foreign, may be ordered through us, our extensive connection guaranteeing prompt service.

FOR THE BEGINNER.

No. 5. The Ferrotype and How to Make it. By E. M. Estabrooke. Cloth-bound, 176 pp., 12mo. This is the standard work on this subject, and will be read with profit by all who desire to make ferrotypes. Plainly worded and well illustrated. Price $1.00, postage 7 cts.

No. 9. Burton's Modern Photography. New edition. By W. K. Burton, C.E. Paper, 126 pp. A splendid book for all who desire to learn photography thoroughly. The various processes are described in a complete yet simple manner. Price 35 cts., postage 6 cts.

No. 12. How to Make Photographs. By T. C. Roche. Edited by E. Anthony. Revised and brought up to date by various authorities. Profusely illustrated. This handbook is absolutely indispensable to both beginner and expert. The best, most comprehensive, and reliable work published. No matter how many books you may have, your library is incomplete without a copy of this book. Price, paper covers, 50 cts., postage 6 cts.; cloth covers, 75 cts., postage 6 cts.

No. 22. Photography for All. By W. Jerome Harrison, F.G.S. 112 pp., 12mo. Illustrated. An elementary text-book in which the various processes and theories are simply explained. Price, paper, 25 cts., postage 3 cts.; cloth, 50 cts., postage 6 cts.

No. 25. Dictionary of Photography. By E. J. Wall. A most valuable book of reference, containing concise and explanatory articles on almost every subject in photography. Useful to both amateur and professional. Printed on heavy coated woodcut paper, 240 pp., handsomely bound in cloth. Price $1.50, postage 10 cts.

First Step in Photography. By F. Dundas Todd. A practical aid to the beginner in photography. In paper covers. Price 25 cts., postage 2 cts.

Second Step in Photography. By F. Dundas Todd. A thoroughly practical handbook for the amateur photographer. In paper covers. Price 50 cts., postage 3 cts.

Amateur Photographer's Handbook. By Arthur Hope. A manual of instruction for the amateur. Contains over two hundred pages of useful information for the amateur, with diagrams and illustrations. Price 75 cts., postage 6 cts.

Artistic Landscape Photography. By A. H. Wall. A series of chapters on the practical and theoretical principles of pictorial composition. With numerous illustrations. Price $1.50, postage 8 cts.

Burton's Manual of Photography. By W. K. Burton, C.E. A practical handbook for all who are taking up photography, and exquisite guide to all photographic manipulations. Price, paper cover, 50 cts., postage 4 cts.

The Camera and its Appurtenances. By H. J. L. J. Masse. A complete guide to the various appurtenances pertaining to negative-making, their uses, etc. Price 25 cts., postage 2 cts.

The Dark-room and its Equipment. By H. J. L. J. Masse. Gives full information regarding dark-room appurtenances. Full of useful hints. Price 25 cts., postage 2 cts.

Developers: Their Uses and Abuses. By Richard Penlake. A handbook of development and developers. Price 25 cts., postage 2 cts.

Indoor Photography and Flashlight Studies of Child Subjects. By Bertha M. Lothrop. Contains over twenty half-tone illustrations. A treatise on flashlight and kindred indoor photography. Price 25 cts., postage 2 cts.

Instantaneous Photography. By Capt. W. de W. Abney. A handbook of practical information on shutter exposures. Price 60 cts., postage 3 cts.

Drop Shutter Photography. By Fred W. Pilditch. Twenty-two half-tone illustrations. A guide to shutter photography in all its phases. Price 25 cts., postage 2 cts.

ON PRINTING.

No. 33. Carbon Printing. By Max Boelte. Contains explicit instructions for the working of this beautiful process. Prints may be obtained in any color by the carbon process. Price, paper, 50 cts., postage 2 cts.

The "A B C" Guide to the Making of Autotype Prints in Permanent Pigments. By J. R. Sawyer. Gives full details of the various processes necessary for making carbon prints. Bound in cloth and excellently illustrated. Price $1.00, postage 5 cts.

Bromide Paper. Instructions for Contact Printing and Enlarging. By Dr. E. A. Just. With bromide paper frontispiece, and more than thirty illustrations in the text. New edition. 156 pp. Price 75 cts., postage 5 cts.

Platinotype: Its Preparation and Manipulation. By Capt. W. de W. Abney and Lyonel Clark. Original English edition. An exhaustive description of the platinum printing process. Price $1.25.

Bromide Enlargements and How to Make Them. By J. Pike. A capital treatise on the subject of bromide enlarging. Price 25 cts., postage 2 cts.

ON LENSES.

On the Choice and Use of Photographic Lenses. By J. H. Dallmeyer. The lens is the life of a photographer's outfit. The characteristics and various qualities of the different kinds of lenses are lucidly set forth. Price 50 cts., postage 2 cts.

The Telephotographic Lens. By T. R. Dallmeyer, F.R.A.S., M.R.I., etc. Splendidly illustrated with magnificent collotypes showing the relative sizes of pictures obtained with ordinary and with telephotographic lenses. Price 50 cts., postage 4 cts.

ON RETOUCHING.

No. 6. The Art of Retouching. By J. Ourdan. Illustrated with lithographed drawings, and heliotypes. A thoroughly reliable guide. Cloth. Price $1.00, postage 6 cts.

The A B C of Retouching. By Andrew Young. With examples of both portrait and landscape retouching, and a guide to the anatomy of expression. Price 25 cts., postage 2 cts.

THE MAGIC LANTERN.

No. 19. The Magic Lantern and its Applications. By L. H. Laudy, Ph.D. 8vo. A very complete handbook for the lantern enthusiast. Cloth. Price $1.00, postage 9 cts.

Lantern Slides: How to Make and Color Them. Illustrated. By D. L. Elmendorf. A thoroughly practical treatise on lantern slide making. Handsomely bound in cloth. Price $1.00, postage 5 cts.

PHOTO-MICROGRAPHY.

No. 18. How to Photograph Microscopic Objects. By I. H. Jennings. The best practical treatise on the subject. Well illustrated. Good for beginner and expert. Cloth. Price, 75 cts., postage 4 cts.

No. 36. Photography Applied to the Microscope. By F. W. Mills. With a chapter on mounting objects for the microscope by J. Charters White. Illustrated with half-tone plates and woodcuts. Price $1.00, postage 6 cts.

ON PROCESS WORK.

Photo-Engraving, Photo-Etching, and Photo-Lithography. By W. T. Wilkinson. Revised and enlarged by Edward L. Wilson, Ph.D. Illustrated, 180 pp., all new. Only American edition. Cloth-bound. Price $3.00, postage 14 cts.

The Half-Tone Process. A practical manual of photo-engraving in half-tone on zinc and copper. By Julius Verfasser. Price, cloth, $1.00, postage 6 cts.

Anderson's Photo-Mechanical Processes and Guide to Color Work. A practical handbook. Copiously illustrated. Gives working details for zinc etching, half-tone, and all the photo-reproduction processes. In flexible leather cover. Price $5.00, postage 7 cts.

A Handbook of Illustration. By A. Horsley Hinton. An exhaustive treatise on reproduction methods and the preparation of originals for reproduction. Fully illustrated. 120 pp. Cloth-bound. Price $1.50, postage 9 cts.

OTHER STANDARD WORKS.

No. 24. Pictures in Black and White. By George Mason ("Mark Oute"). A racy collection of historical sketches. A capital book, full of genuine humor and very instructive. 12mo. 188 pp. Illustrated. Paper. Price 25cts., postage 5 cts.

No. 26. The Chemistry of Photography. By Raphael Meldola, F.R.S., Professor of Chemistry at the Technical College, Finsbury, London. Crown 8vo. Cloth. Price $2.00, postage 11 cts.

Wilson's Cyclopædic Photography. The most comprehensive photographic dictionary ever published. A complete handbook of the terms, formulas, processes, apparatus, and applications of photography. Cloth. Price $4.00, postage 23 cts.

Wilson's Quarter Century of Photography. By Edward L. Wilson, Ph.D. "The best of everything boiled out from all sources." Profusely illustrated, and with notes and elaborate index. Price $4.00, postage 23 cts.

Wilson's Photographics. "Chautauqua Edition." With Appendix. By Edward L. Wilson, Ph.D. A most complete photographic lesson-book. Covers every department. 352 pp. Finely illustrated. Price $4.00, postage 20 cts.

Wilson's Mosaics. Paper cover. Price 50 cts., postage 6 cts.

Crayon Portraiture. By J. A. Barhydt. Complete instructions for making crayon portraits on crayon paper and on platinum, silver, and bromide enlargements. Also directions for the use of transparent water-colors and the making of French crystals. Price, paper, 50 cts., postage 7 cts.; cloth $1.00, postage 10 cts.

Artistic Lighting. By James Inglis, with chapters on "At Home Portraiture" by Daylight and Flashlight, by F. Dundas Todd. Price $1.00, postage 4 cts.

The Art of Making Pictures in Crayon on Solar Enlargements. By E. Long. Third edition, revised. Price $1.00, postage 3 cts.

The Reducer's Manual and Gold and Silver Worker's Guide. By Victor C. Bloede. Second edition. Price 25 cts., postage 6 cts.

The Lighting in Photographic Studios. By P. C. Duchochois. Price 75 cts., postage 3 cts.

Practical Essays on Art. By John Burnett. Containing 130 illustrations, including examples from many of the old masters. Price, cloth, $1.00, postage 10 cts.

Elements of a Pictorial Photograph. By H. P. Robinson. With 37 illustrations and frontispiece. Price $1.50, postage 8 cts.

BOOKS IN LANGUAGES OTHER THAN ENGLISH.

No. 3. El Rayo Solar (Spanish). The only reliable treatise on the art of photography in the Spanish language. Revised and brought up to date. 8vo, 580 pp. Fine toned paper. Cloth. Price $6, postage 21 cts.

No. 13. La Fotografia hecha facil. The Spanish edition of "How to Make Photographs." Revised and enlarged. Illustrated. Cloth. Price $1.00, postage 5 cts.

No. 17. Como fazer Photographias. The Portuguese edition of "How to Make Photographs." Cloth. Price $1.00, postage 5 cts.

"NEW AMERICAN" FILM



CARTRIDGES.

FOR . . .

BUCKEYES . .
BULLSEYES . .
BULLETS . .
KODAKS . .
HAWKEYES . .

MANUFACTURED BY

The American Camera Manufacturing Co.

. . . NORTHBOROUGH, MASS., U. S. A.

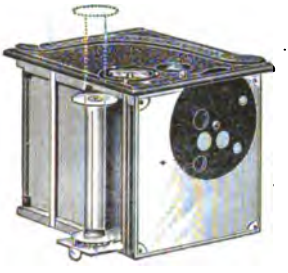
See pages 2-37-51.

1899
Model

BUSCH

TRADE MARK

Cameras



Showing Spool-Carrying Mechanism.



Thoroughly up to date, unique in mechanical arrangements, and beautifully finished.

The American Camera Mfg. Co.

Northborough, Mass., U. S. A.

See pages 2-37-50.

Picture-Makers by Photography

FIND IN "PHOTOGRAMS OF THE YEAR" THE RECORD OF PICTORIAL WORK, AND THE BEST INCENTIVE AND HELP TO FURTHER EFFORTS.

PHOTOGRAMS OF '98

(The Fourth Annual Issue)

Like its wonderfully successful predecessors of '95, '96 and '97, represents modern photography, as "Royal Academy Pictures," "Pictures of the Year," etc., represent Painting and Sculpture.

THE VOLUME

Consists of 112 pages, super royal 8vo (9¾ in. by 6½ in.), printed on heavy "art printing" paper. It is got up and produced in the most delicate and artistic manner, and is more than ever *a worthy representative* of the progress and position of pictorial photography during the year.

THE ILLUSTRATIONS

Are reproductions of *the leading and most beautiful work of the world's best amateur and professional photographers*, the *American Section*, including Alfred Stieglitz, Holland Day, Dr. R. W. Shufeldt, J. E. Hale, Prof. F. W. Smillie, A. G. Wallihan, G. F. Green, S. W. Ormsby, Falk, Frances B. Johnston, S. Hollinger, F. W. Guerin, John Beeby, etc.

THE LITERARY MATTER

Includes a critical essay on the principal *American* pictorial workers, a critical notice of the great British exhibitions, by GLEESON WHITE; and of the non-exhibited work of the year, a *resumé* of the scientific and technical advances in photography, etc.

Handsome Cloth, post free . . 75 Cents
Paper Covers, " " . . 50 "

The ANNUALS of '95, '96, and '97 may still be obtained.

PRESS OPINIONS ON "PHOTOGRAMS OF '95, '96 AND '97."

"So splendidly done that it can be classed with the best American workmanship."—*Fourth Estate (New York).*

"Always a charming volume."—*The Queen.*

"The one photographic annual we could least afford to lose."—*Amateur Photographer.*

"A revelation of the capabilities of the camera."—*Pall Mall Gazette.*

"It has seldom been our lot to see anything more artistically perfect."—*Court Circular.*

"A valuable work of record and criticism, and a constant delight to the eye."—*Daily Graphic.*

"Contains noteworthy specimens of landscape and portrait pictures."—*Daily News.*

Published for *The Photogram*, Ltd.

NEW YORK: Spon & Chamberlain, 12 Cortlandt Street.
BROOKLYN: Bostwick, Harrison & Co., 41 and 43 Marion Street.
PHILADELPHIA: W. P. Buchanan, 1226 Arch Street.

THE ONLY COMPLETELY CORRECTED ANASTIGMATS ARE THE



GOERZ

DOUBLE ANASTIGMATS

As they cover *at full opening sharply up to the Circle of Light*, as no other lens does.

THEY EXCEL ALL OTHER MAKES IN

SPEED, Definition, Even Illumination, and Depth of Focus

and are therefore the best landscape, portrait, and wide-angle lenses.

TRY THE NEW GOERZ SECTOR SHUTTER

ASK FOR CATALOGUE AND TEST CHART FROM YOUR DEALER OR FROM THE MANUFACTURER

C. P. GOERZ

52 East Union Square **NEW YORK**

WORKS: BERLIN, GERMANY

"MODERN AND PROGRESSIVE."

BOTH . . . PLEASED. You with our *prices*, *promptness*, and *manner* of doing business, and we to have your orders for PHOTO. SUPPLIES.

Now on Ground Floor with increased stock and facilities.

BUTTS & ADAMS,

459 Washington Street, **BUFFALO, N. Y.**

EIKONOGEN AND HYDROCHINONE DEVELOPING POWDERS

Produce beautiful negatives with all the softness of Eikonogen and the density of Hydrochinone. They are prepared ready for mixing with water and are most convenient.

PRICE, PER BOX OF SIX POWDERS, 25 CENTS.

FOR SALE BY ALL DEALERS.

Highest Quality Half-Tones

12 Cents per square inch.

Electric City Engraving Co.,

507–513 Washington Street,

See Specimens in this book. Buffalo, N. Y.

E. M. GILL, PRES'T. G. M. GILL, TREAS

The Gill Engraving Co.,

HALF-TONE ENGRAVERS.

104 Chambers Street, *New York.*

STRICTLY HIGH GRADE CAMERAS.

MONTAUK



STEREOSCOPIC TWIN LENS

AND

Long Focus Reversing Back.

Send for Catalogue
Including our Grey Day Series.

G. GENNERT, Manufacturer,

24 & 26 E. 13th St. **NEW YORK.**

Factory: JERSEY CITY, N. J.

Good Things



ENGLISH

Ross Lenses

Ross–Zeiss

Ross–Goerz

17 Series for all the Possible Needs of the Amateur and Professional, Fitted with

Iris Diaphragm, or

Thornton Pickard Shutter.

$\frac{1}{100}$ sec.	T. & I. before Lens.
$\frac{1}{100}$ "	T. & I. behind Lens.
$\frac{1}{100}$ "	Stereoscopic.
$\frac{1}{1000}$ "	Focal Plane



ADJUSTABLE AND INTERCHANGEABLE.

G. GENNERT, Importer,

24 & 26 E. 13th Street, New York.

ORTOL

REPLACES PYROGALLIC ACID

SUPERB DENSITY
COLOR, AND CLEARNESS

FOR SALE



EVERYWHERE

FOR RAPID WORK
INSTANTANEOUS PHOTOGRAPHY
PLATES OR FILMS

NOTHING EQUAL TO

METOL

G. GENNERT, Agent, New York

Collinear Lenses

ARE THE LATEST AND BEST.



Double Anastigmats

POINTS OF SUPERIORITY:

DOUBLE THE SPEED.
BETTER CORRECTION.
GLASS DOES NOT TARNISH

TESTIMONIAL.

DR. A. MIETHE, H.F.R.R., Ph.S., says, in November, 1897:

By the new construction of the Collinear Lenses the *Double Anastigmats* have been ***superseded*** in different ways. Not only have the anastigmatic error and curvature of the field been corrected for very oblique pencils in a high degree, but also the rapidity of the lenses (Collinear Series II) has arrived at the double value of other anastigmats. In addition, it must be stated that the new Collinear Lenses are also in technical respects superior, inasmuch as the soft crown-glass lens—always liable to be tarnished in the open air—in the Collinear Lens is cemented between two lenses of resistant glasses able to withstand atmospheric influences also in moist and warm climates.

CATALOGUE FREE. FOR SALE BY DEALERS.

VOIGTLAENDER & SON

OPTICAL CO.

467 WEST FOURTEENTH STREET, NEW YORK.

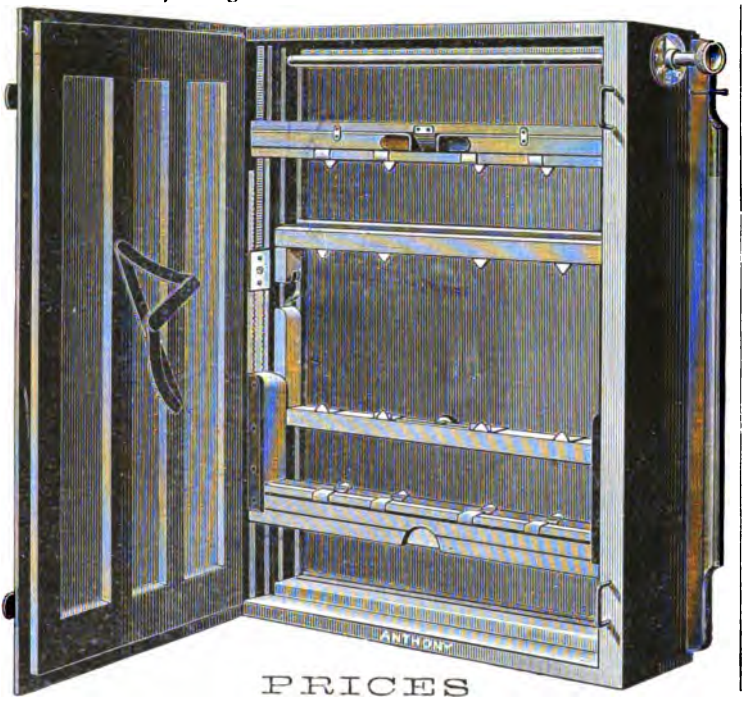
ANTHONY'S

PATENT LINED SCREEN HOLDER

CONSTRUCTED ON THE BENSTER PRINCIPLE.

Holds any size of plate or screen, and distance between plate or screen may be regulated from the outside of the Holder.

The Most Perfect Lined Screen Holder Made.



The Most Perfect Lined Screen Holder Made.

PRICES

ANTHONY'S PATENT LINED SCREEN HOLDER.

		Ground Glass and Frame.	Frame only for Ground Glass.
8 x 10	$18.00	$3.00	$1.50
10 x 12	22.50	3.25	1.50
11 x 14	28.00	3.50	1.88
14 x 17	32.00	4.00	2.25
17 x 20	36.00	4.50	2.63
18 x 22	40.00	5.50	2.63
20 x 24	45 00	6.50	3.00

O. I. C. COPYING CAMERAS.

Fitted with Patent Lined Screen Holder.

8 x 10	$45.00	11 x 14	$65.00	17 x 20	$85.00
10 x 12	55.00	14 x 17	75.00	18 x 22	95.00
		20 x 24	$120.00		

COPYING, ENLARGING AND REDUCING CAMERAS.

Fitted with Patent Lined Screen Holder.

8 x 10	$50.00	11 x 14	$75.00	17 x 20	$105.00
10 x 12	60.00	14 x 17	90.00	18 x 22	120.00
		20 x 24	$135.00		

E. & H. T. ANTHONY & CO., 591 Broadway, New York; 45-47-49 E. Randolph St., Chicago.

The Farrand Vignetter.



Simple of Construction.

Easy of Manipulation.

EVERY MOVEMENT POSSIBLE WITHOUT LEAVING THE BACK OF CAMERA . . .

The Camera rests upon the bed provided for it, which can be placed on any camera stand, and the vignetter is slotted beneath it, working freely on its axis, and giving a rotating motion to the toothed card, which may be slanted at a greater or lesser angle by means of the handle behind the Camera, or may be raised or lowered by the small rod that runs through its axis and works upon the chain.

Price, $10.00.

E. & H. T. ANTHONY & CO.,

591 Broadway, New York. 45-47-49 E. Randolph St., Chicago.

LUMINO = =

The perfect flash powder for all lamps, except hand lamps of magazine pattern. Maximum illumination, minimum smoke and noise.

Per Ounce Bottle, - - 60 Cents.

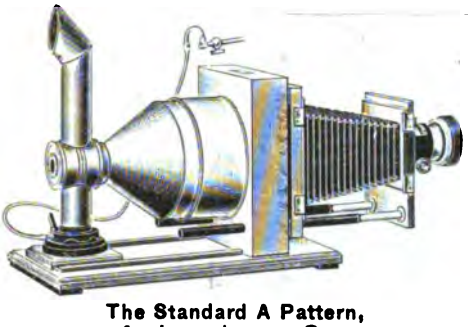
FOR SALE BY ALL DEALERS.

The CANTILEVER

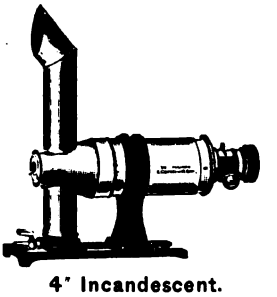
ENLARGING APPARATUS.

The Neatest and Best Enlargers in the Market

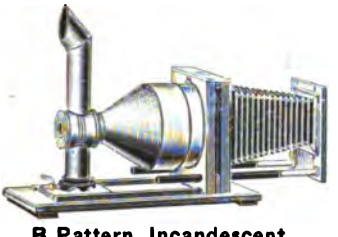
FOR BUSINESS AND AMATEUR PHOTOGRAPHERS.



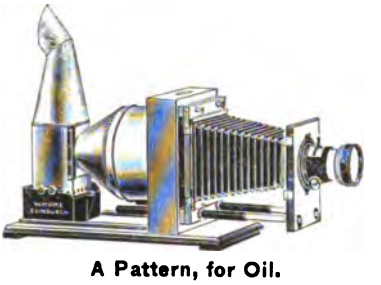
The Standard A Pattern, for Incandescent Gas.



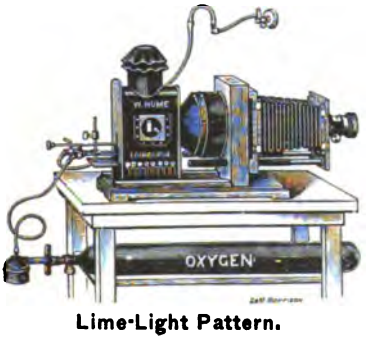
4" Incandescent.



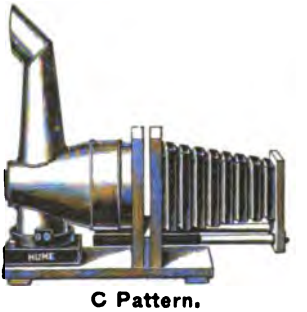
B Pattern, Incandescent.



A Pattern, for Oil.



Lime-Light Pattern.



C Pattern.

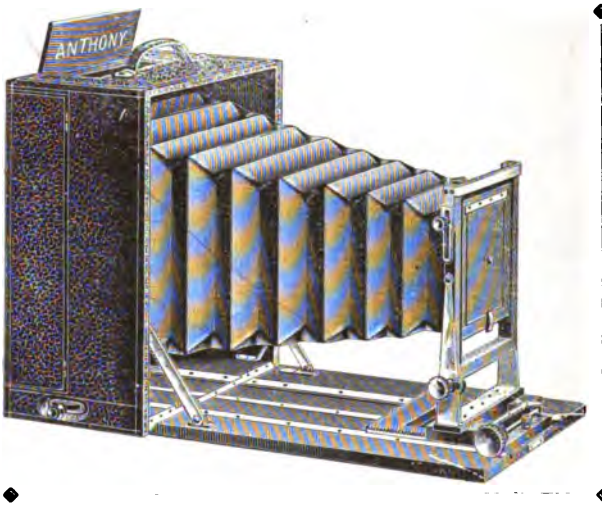
WRITE FOR FULLY ILLUSTRATED CATALOGUE.

DESIGNED AND MANUFACTURED ONLY BY

WILLIAM HUME, 1 Lothian Street, Edinburgh, Scotland.

THE

MARLBOROUGH CAMERA.



A Perfect Model of Ingenuity.

For Hand and Tripod Use.

For Wide Angle and R. R. Lenses.

Has Reversing, Self-Adjusting Spring Swing Back; Rising, Falling, and Swing Front; and is handsomely finished in Leather.

Send for "MARLBOROUGH BOOKLET."

Prices, including Two Double Holders:

8 x 10	$40.00	5 x 7	$35.00
6½ x 8½	36.00	5 x 7, with lens and shutter,	50.00

E. & H. T. ANTHONY & CO.,

591 Broadway, N. Y. **45-47-49 East Randolph St., Chicago.**

Halftones

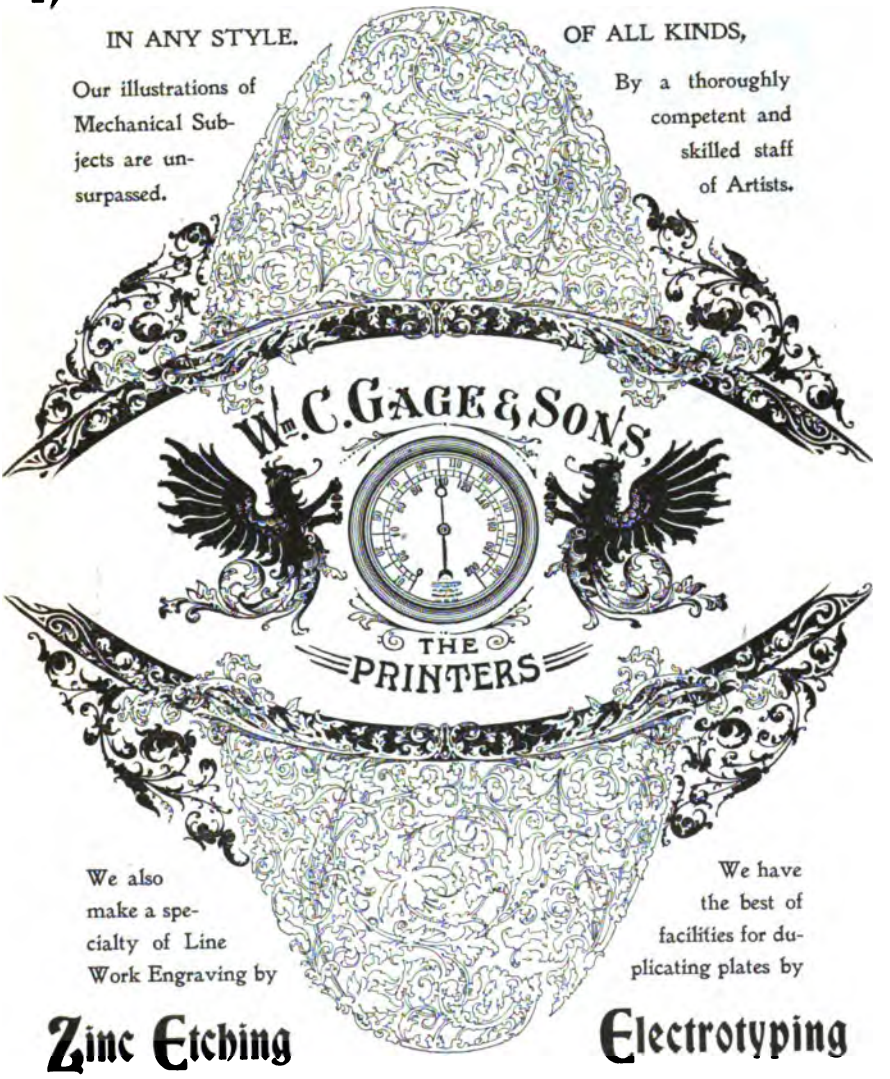
IN ANY STYLE.

Our illustrations of Mechanical Subjects are unsurpassed.

Designing

OF ALL KINDS,

By a thoroughly competent and skilled staff of Artists.



We also make a specialty of Line Work Engraving by

Zinc Etching

We have the best of facilities for duplicating plates by

Electrotyping

General Job Printing.

Prompt execution of Railroad and other large Contracts. Write for Estimates.

BATTLE CREEK, MICHIGAN.

QUAD CAMERA

3¼ x 3¼ Plates.	Positively Accurate.	No Chance of Error.	Handsomely Covered with Leather.

PRICE $5.



Send two-cent stamp for Sample Photograph and Booklet.

E. & H. T. ANTHONY & CO., 591 Broadway, NEW YORK.
45-47-49 East Randolph St., CHICAGO.

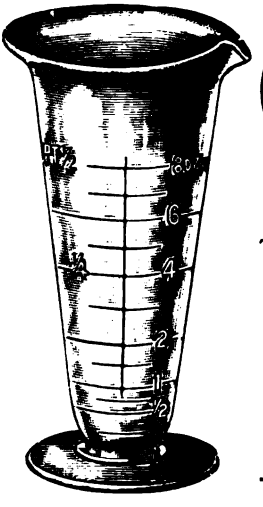
Designing and Illustrating

THE BALTIMORE ENGRAVING COMPANY

4 SOUTH CALVERT STREET

BALTIMORE, MD.

Halftone and Zinc Work



THE

CLIMAX GRADUATE

LINES ETCHED CORRECTLY.
FIGURES RAISED.

The Handiest Graduate for Photographers.

No Trouble
To Measure Accurately
When in the Darkroom.

1-ounce,	12 cents.	4-ounce.	20 cents.
2-ounce,	15 "	8-ounce,	30 "
16-ounce,	40 cents.		

E. & H. T. ANTHONY & CO., 591 Broadway, New York.

P. & B. PHOTOGRAPHIC LACQUER

For renovating Trays, Dishes, Tanks, Tubs, etc. Renders them impervious to acids and alkalies, and stops all leaks. No heating required; always ready for use.

SOLD IN TIN CANS WITH SCREW TOPS.

5-gallon cans, per gallon,	$1 50	½-gallon cans, per ½ gallon,	$0 85
1 " " " "	1 60	Quart cans, per quart,	45
Pint cans, per pint,	$0 25		

USEFUL ALIKE TO PHOTOGRAPHERS AND PHOTO-ENGRAVERS.

E. & H. T. ANTHONY & CO.,

591 Broadway, New York. **45-47-49 East Randolph St., Chicago.**

PHOTO ENGRAVING
FOR ALL ARTISTIC AND
MERCANTILE PURPOSES.

ELECTRO LIGHT ENGRAVING Co.

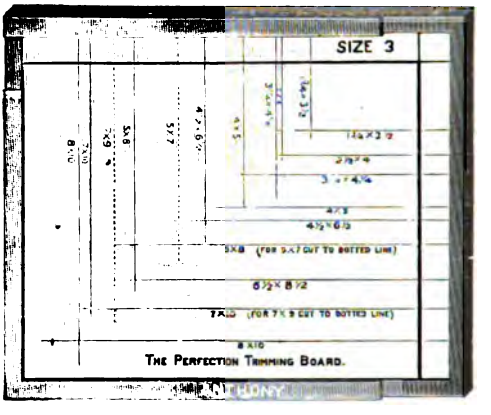
CHAS. A. BRECK
B. W. WILSON JR.
PROPRIETORS.

COR. PEARL & NEW CHAMBERS STS.
NEW YORK

ORIGINAL DESIGNING & COLOR WORK SPECIALTIES.

The Perfection Trimming Board.

TRIM . .
YOUR . .
PRINTS



ONE GLASS PATTERN SUFFICES FOR ALL SIZES.
NO MEASURING OR MARKING NECESSARY.

PRICES:

Up to 4 x 5 . $1.00 | 5 x 8 . . $1.25 | 8 x 10 . . $1.50

For Sale by all Photographic Stock Dealers, and by E. & H. T. Anthony & Co.

Photo Chromotype Engraving Co.,

Designers, Photo-Engravers.

Oil and Water Color Paintings Reproduced in their Original Colors by our Three-Color Method.

High Grade Half-Tone and Line Engraving.

Die Sinking, Brass Stamps.

719-723 Vine Street. ***PHILADELPHIA.***

"A word to the wise," etc. from

H. A. HYATT

Mfr., Jobber and Dealer in

PHOTOGRAPHIC SUPPLIES

410 and 412 North Broadway, St. Louis, Mo., U. S. A.



PATENT APPLIED FOR.

Throw aside your Cumbersome Trays. Use the

California Automatic Print Washer.

The ingenious construction of this apparatus causes a constant rocking from side to side, commencing automatically, and ceasing only when the flow from the water-supply is shut off. Prints are kept continually moving and afloat, because the upward direction taken by the water coming through the small holes in the bottom prevents settling and packing—the universal fault of washers generally. The overflow into the compartments at either end insures fresh water at all times. The Washer being perfectly automatic, requires no watching, and the prints requiring no handling, an immense gain is thereby realized in time and labor, to say nothing of the absolute assurance of the perfect washing of prints.

PRICES.

No. 1.	**12 x 12 inches**	**$7.00**
No. 2.	**20 x 20 "**	**8.50**
No. 3.	**25 x 25 "**	**10.00**

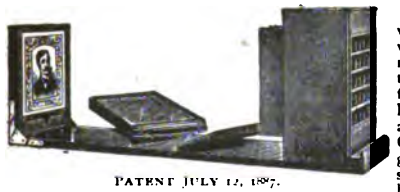
NOTE.—The sizes given above are the measurements of the compartment for prints.

OUTSIDE MEASUREMENTS.

No. 1, 13 x 20 inches. No. 2, 21 x 30 inches. No. 3, 26 x 37 inches.

For convenience of those who have only small sinks, we give the extreme outside dimensions of each size Washer, in order that mistakes will not occur in ordering, and finding that the Washer will not fit into sink intended for its use.

HYATT'S PATENT STAMP PORTRAIT APPARATUS



PATENT JULY 12, 1887.



In almost every corner of the world will be found one of these wonderful little money-making machines for the production of the stamp photograph. Twenty-five accurately ground and tested little lenses, correctly focussed and adjusted to make 25 images. Copies from a cabinet-size photograph on a 5 x 7 plate, is the scheme. The photo. is held behind a border design on the easel; the negatives and prints are made in the usual manner. Samples, and a descriptive catalogue, will be mailed on application to any address.

PRICES OF APPARATUS.

Stamp size, 25 lenses, for 25 on a 5 x 7 plate..$50.00
" " 16 " " 16 " 4 x 5 " .. 25.00
Minette size, 8 lenses, for 8 on a 5 x 8 plate..$40.00
" " 4 " " 4 " 4 x 5 " .. 25.00
Combination Stamp and Minette, 16 Stamps or 4 Minettes, 4 x 5..... 40.00
Perforators for Perforating Stamp and Minette Photos, under our Patent issued July 12, 1887... 35 00

CAN'T YOU USE A SHOW-CARD IN YOUR WINDOW OR OFFICE?

LEIGH'S COMBINATION-PHOTO PRINTING FRAME



STOP AND THINK!!

Where can be found a more pleasing photograph than a COMBINATION PRINT, made from three or four negatives?

How often it happens that you make six or more negatives of a cute, attractive child, and its mother would like to have them all finished but cannot afford to; if you have the Combination Printing Frame you can satisfy her desire, and at the same time increase the order enough to pay for the frame. Photographers operating galleries, and photographers making views, come alike within its field of usefulness, while in the hands of the amateur excellent results are obtained from kodak work.

The large number of these frames that have been sold and the reputation of their purchasers, alone testify to their practicability.

If you intend to do portrait printing, "end-opening frames" should be used; for landscape work, "side-opening frames."

PRICE LIST.

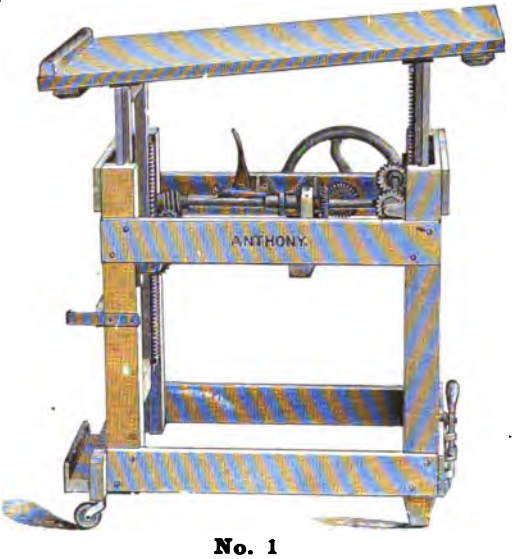
4¼ x 6½.....each $2.25	5 x 8.....each $2.50	8 x 10.....each $3.50
5 x 7..... " 2.50	6½ x 8½..... " 3.00	11 x 14..... " 5.00

NOTICE.—End-opening frames use strips of paper the width of the narrowest dimension of the frame. Side-opening frames, the width of the longest dimension. Always specify which is wanted.

Send for Catalogue of Specialties.

H. A. HYATT, ST. LOUIS, MO.

NEW YORK CAMERA STAND



No. 1

NO WEIGHTS

NO ROPES

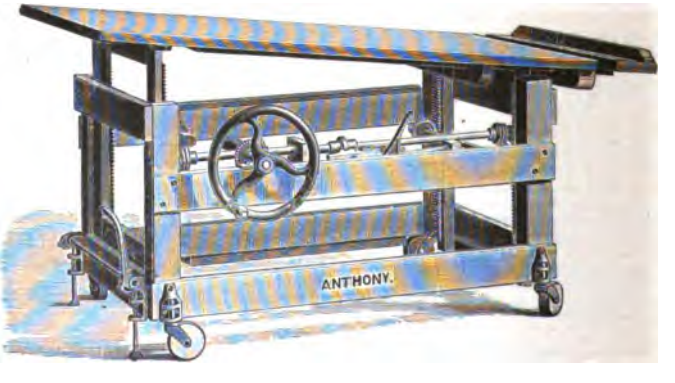
ONE WHEEL

EFFICIENT

SIMPLE

PRICE

No. 1.	For Cameras up to 11 x 14	$16.50
No. 2.	" " " 20 x 24	21.50
No. 3.	For larger sizes	32.50



FOR SALE BY ALL DEALERS

ACTIEN-GESELLSCHAFT FÜR ANILIN-FABRIKATION,
Photographic Department,
Berlin, S. O.



TRADE MARK.

DEVELOPERS:

EIKONOGEN, RODINAL, AMIDOL, DIOGEN, DIPHENAL.

SOLD BY ALL DEALERS.

Ask your Dealer for Formulæ and Samples.

ANDERSON'S

PHOTO-MECHANICAL PROCESSES

AND

GUIDE TO COLOR WORK.

Copiously Illustrated. **A Practical Hand Book.**

Gives working details for Zinc Etching, Half Tone, and all the Photo-Reproduction Processes.

"Has a wide scope, and terse, practical description has enabled it to be a perfect *multum in parvo*."—*The British Printer*.

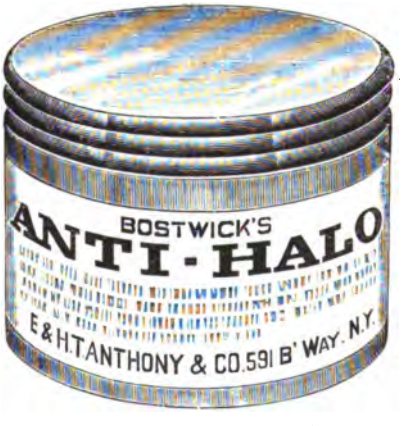
"An inexhaustible mine of information, the greater part of which is not to be found elsewhere."—E. DEVILLE.

"By a writer of experience and ability. Will be appreciated by all process workers."—*Scientific American*.

SUPERBLY PRINTED, FLEXIBLE LEATHER COVER, PRICE, . . $5

E. & H. T. ANTHONY & CO. - NEW YORK & CHICAGO.

BACK YOUR PLATES



WITH

ANTI-HALO

AND SO PREVENT

HALATION.

ANTI-HALO IS EASILY APPLIED, EASILY REMOVED, AND WILL NOT SCRATCH OFF.

TRY ANTI-HALO ON YOUR FAVORITE PLATE.

Size No, 1, 60 cts. **Size No. 2, $1.00.** **By Mail, 10 cts. Extra.**

FOR SALE BY ALL DEALERS.

When purchasing a Developer "
please be particular to specify

SCHERING'S

the oldest and most
favorably known brand

Put up with labels and seals as per fac-similes here given



REGISTERED. REGISTERED.

SEE THAT YOU GET THE GENUINE "SCHERING'S."

Excelled by none. The standard of the third—last—edition of the German Pharmacopœia.

FOR SALE TO THE TRADE BY

E. & H. T. ANTHONY & CO., 591 Broadway, New York.

Recent Improvements in Manufacture

MAKE

CLIMAX PLATES

"THE QUICKEST ON EARTH."

Clean. *Brilliant.* *Uniform.*

READ WHAT USERS THINK OF THEM.

C. O. LOVELL, Esq.

Dear Sir,—The three cases, 7 x 10 plates, received O. K., and after thoroughly testing them, I can assure you that no plates I have ever used have given any better satisfaction. My operator is delighted with them, so you may safely count on the "Climax" being a fixture with us. Kindly keep a few cases in reserve as I shall want you to duplicate my order, and also some larger sizes very soon. Wishing you success, I am, yours, etc., C. B. CONANT.

LOVELL DRY PLATE CO.

Gentlemen,—For over a year I have found an ever-increasing pleasure and profit in the use of "Climax Plates," and wish to heartily congratulate you on having attained so high a standard of all-around excellence. My operations are of so varied a nature and exacting in their requirements that I have found no other brand could be depended upon so fully as yours, especially in summer's heat and winter's cold. In overcast days they prove indeed the "Climax" of the photographer's fondest hopes. Their combination of wonderful qualities is peculiar to themselves. They are developed with the utmost simplicity, and adapted perfectly to every printing process, being *par excellence* for mat-surface papers. "Climax Extra" is as much to be depended upon through the winter as death and taxes, and works *faster than the light itself.* In fact, I have realized far greater success, and saved incalculable time, worry, and money since having adopted them. With best wishes, I remain, sincerely yours, FRANK P. JEWETT.

Mr C. O. LOVELL.

Dear Sir,—The "Climax" are all right. I have used over one hundred dozen in Portrait and View work during the past eight weeks, and have found them uniformly clean and rapid and producing negatives of superior quality. I take pleasure in recommending your Plate. Yours truly, A. L. CHILD.

For Sale by All Dealers. *Send for New Climax Booklet.*

TRADE AGENTS, **E. & H. T. ANTHONY & CO.,**

591 Broadway, New York;

45, 47, 49 East Randolph Street, Chicago.

Coloritype Company

HIGH GRADE

COMMERCIAL AND ART COLOR-WORK BY OUR COLORITYPE PROCESS (PATENTED) ◆ ◆ ◆ ALSO HIGH CLASS PHOTO-ENGRAVINGS AND LINE ETCHINGS ◆ ◆ ◆ ◆ ◆ ◆ ◆

Nos. 32 and 34 Lafayette Place
New York

Process Printing Frames.

PROPERLY CONSTRUCTED. THOROUGHLY PRACTICAL. ABSOLUTELY RELIABLE.

The strongest frame on the market.

Bolts pass clear through the sides, preventing breakage, even under greatest pressure.

Iron Screws, giving maximum pressure and no chance of breaking.



8x10,	3	Bars,	6	Screws,	$9.00	17x20,	5	Bars, 20 Screws,	$19.50
10x12,	3	"	6	"	9.50	18x22,	5	" 20 "	22.50
11x14,	3	"	6	"	10.50	20x24,	6	" 24 "	27.50
14x17,	4	"	12	"	14.50				

E. & H. T. ANTHONY & CO., NEW YORK AND CHICACO.

ESTIMATES PROMPTLY FURNISHED ON ALL SUPPLIES.

R. B. TEACHENOR. E. G. BARTBERGER. ROGER CUNNINGHAM.

Teachenor-Bartberger Engraving Co.,

Designers.

Halftone and Photo Zinc Etchers.

Wood Engravers.

: : : : **KANSAS CITY, MO.**

Developing :: Toning

Solutions AND Powders

Metacarbol, 1 oz. bottle to make 192 ozs. of Developer	$0.75
Hydroquinone Developer, 8 oz. bottle	.30
" " 16 "	.55
New Economical Developer, 8 oz. bottle	.40
Ferrous Oxalate Developer, 2-8 oz. bottles	.50
Cooper's Conc. Developer, 8 oz. bottle	.50
Stanley's Conc. Pyro. Developer, 2-8 oz. bottles	.50
Climax Developer, 8 oz. bottle	.30
" " 16 "	.55
New Climax Developer, 2-8 oz. bottles	.50
Hyko Developer, 2-8 oz. bottles	.50
Eikonogen Developer, 8 oz. bottle	.30
" " 16 "	.50
Concentrated Hydrochinone, 2 oz. bottle	.30
Intensifier, 2-8 oz. bottles	.50
Reducer, 8 oz. bottle	.30
Aristotone, 8 oz. bottle	.40
Toning and Fixing Solution, 8 oz. bottle	.40
Albutone, 8 oz. bottle	.40
Compound Toning Tablets, 24 in bottle	.25
Compound Toning Powders, 12 in box	.15
" " " 24 "	.25
" " " 48 "	.40
E. A. Developing Powders, 12 "	.50
Eikonogen " " 6 "	.25

MADE WITH E. A. STANDARD CHEMICALS

OBTAINABLE FROM ALL PHOTO STOCK DEALERS



Premo Cameras

Embody all that is best.

We have been engaged fifteen years in the manufacture of cameras, and experience counts for much in the designing of Photographic Apparatus. That's why

Premos Produce Perfect Pictures.

Rochester Optical Co.

Rochester, N. Y.

Catalogue upon request.

Western Engraving Company,

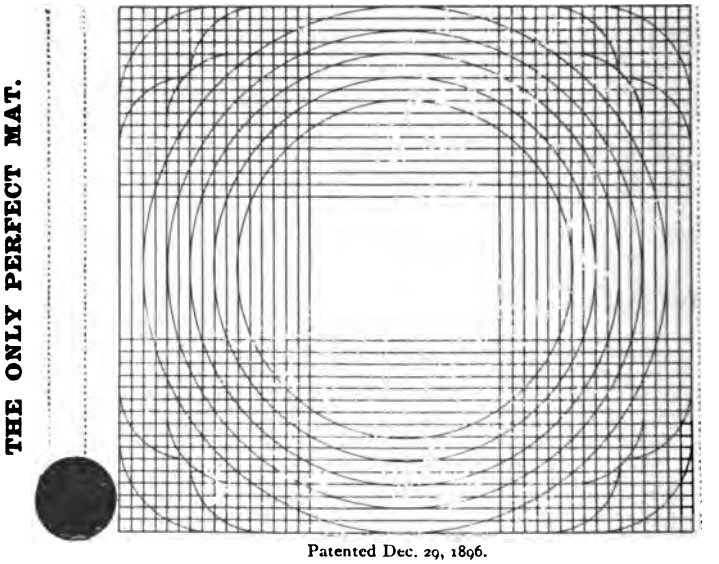
214-216 CHESTNUT STREET, ST. LOUIS, MO.

We refer to our engravings as shown in this Annual as samples of our half-tone work.

THREE-COLOR HALF-TONE WORK OUR SPECIALTY.

Send for Samples and Prices.

OLMSTED'S LANTERN SLIDE MAT.



Patented Dec. 29, 1896.

E. & H. T. ANTHONY & CO., New York and Chicago.

HALF-TONE AND ZINC ETCHING. WAX, METAL, AND WOOD ENGRAVING.

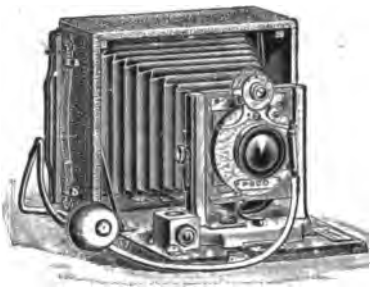
Geo. H. Benedict & Co.,

Designers, Engravers, and Electrotypers.

Steel-Die Embossing, Copper-Plate Engraving
Plate-Printing, and Photo-Lithographing.

175-177 CLARK STREET, CHICAGO, ILL.

OUR IMPRINT ATTESTS EXCELLENCE. LONG DISTANCE TELEPHONE, MAIN 1700.



Important

Don't read this if you are not looking for bargains in cameras, lenses, and photo supplies. **Cameras**—we have the largest stock of new and *exchanged* cameras on hand. **Lenses**—there is no house in the U. S. that has the stock that we carry. All bargains, every one of them. Dry plates purchased direct from the factory; best possible discounts allowed. We are the originators of popular prices, but sell for cash only.

Reference: EASTMAN KODAK CO., ROCHESTER OPTICAL CO., ROCHESTER CAMERA CO., of Rochester, N. Y.; E. & H. T. ANTHONY & CO., SCOVILL & ADAMS, GEO. MURPHY, of New York City.

New York Camera Exchange

J. H. & J. ANDREWS, PROPRIETORS.

Up-town Branch
56 East 23d Street.

39 and 41 Fulton Street,
New York City.

Satisfaction guaranteed or money refunded. Send two-cent stamp for "BARGAIN LIST.

ANTHONY'S

AUTOMATIC

Cabinet Attachment

SAVES TIME, LABOR, AND WORRY.



READY FOR EXPOSURE.

The plate-holder being adjusted, and the focusing being done, the attachment is moved, and the curtain slide automatically withdrawn.

No lifting out of the ground glass.

For 8 x 10 Cameras, with C. S. Holder, 5 x 8, 5 x 7, or 4¼ x 6½	$10.00
For 11 x 14 Cameras, as above	12.00
For 14 x 17 Cameras, as above	13.50
For 17 x 20 Cameras, as above	15.00
Extra curtain slide holders, each	1.50

For making two on 8 x 10, 7 x 10, *or* 6½ x 8½ *plates, special attachments are made.*

8 x 10 for 8 x 10 Cameras	$13.00
8 x 10 for 11 x 14 Cameras	15.00
Extra Holders, each	4.00

FOR SALE BY ALL DEALERS.

A. M. COLLINS MANUFACTURING COMPANY

Office and Warehouse

No. 527 Arch Street

Philadelphia

MANUFACTURERS OF ALL KINDS OF

CARDS

--- AND ---

CARDBOARDS

Required for Photographers' Use

These Standard Goods are for sale by all Dealers in Photographic Supplies

IMPROVED

Automatic Focusing, Electric Lamp

FOR PHOTO-ENGRAVING.

CANDLE POWER 6000.

Read what the *Boston Herald* thinks about it:

OFFICE OF THE BOSTON HERALD, BOSTON, MASS.

Messrs. A. T. THOMPSON & Co., BOSTON, MASS, April 5, 1898.

Gentlemen,—Two of your photo-engraving lamps have been in use in our engraving department of the *Boston Herald* for the past three months. During that time they have clearly demonstrated their superiority over other lamps hitherto tried. In intensity and steadiness of light they are unequaled. From experience with these and other lamps I should unhesitatingly declare in favor of A. T. Thompson & Co.'s apparatus.

Yours very truly,
W. J. HYNES (In charge of Art and Engraving Dept).

PRICES:

6000 Candle-Power Lamp, Reflector, Adjustable Floor Stand and Rheostat, . $100.00
Per Pair, with one Rheostat, for Burning in Series, ... $175.00

E. & H. T. ANTHONY & CO., SOLE TRADE AGENTS, NEW YORK and CHICAGO.

Elmendorf's Lantern Slide Colors



The only colors that will give satisfactory results for lantern-slide tinting. Put up in concentrated form, each box containing ten bottles of color.

COLORS

LIGHT YELLOW, BROWN, DARK YELLOW, MAROON, ORANGE, BLUE No. 1, BLUE No. 2, ROSE, VERMILION, VIOLET.

PRICE

No. 1, - - - - - - $1.50 | No. 2, - - - - - - $2.50

E. & H. T. ANTHONY & CO., New York and Chicago.

BOOKS FOR PHOTOGRAPHERS.

NET.
s. d.

A GUIDE TO MODERN PHOTOGRAPHY.
By HAROLD BAKER. This book is written essentially for the beginner. Strongly bound in cloth and illustrated (postage 1½d.) 0 6

THE PHOTOGRAPHIC COLOURIST.
A manual for the use of amateurs. Giving every particular required for painting lantern slides and other transparencies, colouring diagrams, preparing lantern slides without the aid of photography, blacking out backgrounds, scratching in details, tinting paper prints, colouring paper prints to imitate oil paintings, crystoleum paintings, etc. By J. W. NEVILLE. Cloth bound, 12mo (postage 1d.) 0 6

PRACTICAL ENLARGING.
By JOHN A. HODGES. Concise instructions to amateurs for the production of photographic enlargements. Illustrated. Cloth bound (postage 2½d.) 1 0

PHOTOGRAPHY IN A NUTSHELL.
By "THE KERNEL." Crown 8vo. New edition, revised and enlarged. Attractive paper covers (postage 2d.) 1 0

PHOTOGRAPHY FOR ALL.
An elementary text-book and introduction to the art of taking photographs. By W. JEROME HARRISON, F.G.S. A thoroughly practical and useful little manual. Crown 8vo, 4th edition (thoroughly revised), cloth bound. Illustrated (postage 2d.) 1 0

THE HAND CAMERA AND HOW TO USE IT.
By WALTER D. WELFORD. Revised edition. With illustrations in half-tone. Crown 8vo. Bound in cloth 1 0

SHORT LESSONS IN PHOTOGRAPHY.
By G. ARDASER, Member of Royal Photographic Society of Great Britain. Dedicated to H. H., the Duke of Teck. An admirable second book for the student. Crown 8vo. Well illustrated and bound in neat paper covers (postage 2½d.) 1 0

PHOTOGRAVURE.
By W. T. WILKINSON. With illustrations by W. L. Colls. Crown 8vo. Paper covers. (postage 1d.) 1 6

THE FIRST PRINCIPLES OF PHOTOGRAPHY.
By CLEMENT J. LEAPER. With numerous diagrams and illustrations. Crown 8vo. Cloth bound (postage 3d.) 5 0

AN INTRODUCTION TO THE SCIENCE AND PRACTICE OF PHOTOGRAPHY.
Third edition. Revised and enlarged. By CHAPMAN JONES, F.I.C., F.C.S. With numerous illustrations. Crown 8vo. Paper cover 2 6
Ditto ditto cloth bound (postage 4d. and 3d.) 3 6

PHOTOGRAPHY ANNUAL
(*Published in July*).—Edited by HENRY STURMEY. A splendidly illustrated compendium of information and statistics of the year. Six hundred pages of reading matter and illustrations. Demy 8vo. Handsome paper covers (postage 5d.) 2 6
Cloth bound, gilt lettered 3 6
"Far in advance of any competitor."—*Vide Public Press.*

PHOTO-MICROGRAPHY.
By ANDREW PRINGLE, F.R.M.S. Royal 8vo, cloth cover, with numerous illustrations (postage 4½d.) 5 0

A TREATISE ON PHOTOGRAVURE.
In Intaglio, by the Talbot-Klic process. By HERBERT DENISON, F.R.P S. A standard work which cannot be too highly commended; strongly bound in buckram (postage 3d.) . 4 6

THE PHOTOGRAPHIC REFERENCE BOOK.
Hints, information, and methods concerning all kinds of photographic work and recreation. Compiled by W. A. WATTS, M.A., under the direction of Henry Sturmey, editor of *Photography*. A comprehensive work of over 400 pages. Copiously illustrated, and well bound in cloth (postage 4d.) 6 0
"Of infinite value to professional and amateur."

THE GUM-BICHROMATE PROCESS.
A book of instruction for obtaining a permanent photograph in pigment by photographic means *without transfer*. With illustrations. By W. J. WARREN. Cloth covered (postage 2d.) 1 0

THE ENCYCLOPÆDIA OF PHOTOGRAPHY.
By WALTER E. WOODBURY. Containing over 1500 references, and illustrated with above 200 explanatory sketches and diagrams. Cloth bound (postage 6d.) 7 6

THE PLATINOTYPE PROCESS.
A practical guide. By W. J. WARREN. Cloth bound (postage 2d.) 1 0

ILIFFE SONS & STURMEY, Ltd.
3 St. Bride Street, London, E.C.

Risks May be Taken

WHEN ONE CAN AFFORD TO LOSE AND THERE IS A FAIR CHANCE TO MAKE A GREAT GAIN. OTHERWISE RISKS ARE *RUINOUS.*

NO PHOTOGRAPHER CAN AFFORD TO RISK THE PERMANENCY OF HIS WORK. IT IS THE KEYSTONE OF HIS SUCCESS. THAT IS WHY *THE AMERICAN ARISTOTYPE CO.'S* PRODUCTS ARE IN DEMAND. NO RISKS ARE TAKEN. TEN YEARS' EXPERIENCE IN ALL CLIMATES OF THE GLOBE PROCLAIMS THEM THE MOST PERMANENT KNOWN TO THE ART.

E. & H. T. ANTHONY & CO.,
Trade Agents,
591 BROADWAY, N. Y.
45-47-49 EAST RANDOLPH ST.,
CHICAGO.

AMERICAN ARISTOTYPE CO.,
Manufacturers,
JAMESTOWN, N. Y.